

# **CORONAVIRUS DISEASE (COVID-19): PSYCHOLOGICAL, BEHAVIORAL, INTERPERSONAL EFFECTS, AND CLINICAL IMPLICATIONS FOR HEALTH SYSTEMS**

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## **CORONAVIRUS DISEASE (COVID-19): PSYCHOLOGICAL, BEHAVIORAL, INTERPERSONAL EFFECTS, AND CLINICAL IMPLICATIONS FOR HEALTH SYSTEMS**

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# Anxiety Status and Influencing Factors of Rural Residents in Hunan During the Coronavirus Disease 2019 Epidemic: A Web-Based Cross-Sectional Survey

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**Objective:** To explore the status quo of anxiety and its influencing factors among rural residents in Hunan Province during the coronavirus disease 2019 epidemic, and to provide an effective basis for prevention of and intervention for anxiety symptoms among rural residents.

**Methods:** Convenience sampling was used. An online questionnaire was distributed to Hunan rural residents through the questionnaire star platform from February 26–29, 2020. The general data and anxiety of Hunan rural residents were investigated, and the data were analyzed using SPSS 18.0.

**Results:** The mean Self-Rating Anxiety Scale score of 179 rural residents in Hunan was  $40.93 \pm 9.36$ . Based on the cutoff criteria, 32 residents had anxiety, including 26 with mild anxiety, five with moderate anxiety, and one with severe anxiety. The detection rate of anxiety was 17.88%. Self-rated health status, level of concern about the epidemic, and self-rated impact of the epidemic on one's life were the factors influencing the anxiety score of rural residents in Hunan ( $P < 0.05$ ).

**Conclusion:** During the coronavirus disease 2019 epidemic, the detection rate of anxiety in rural residents in Hunan was higher than that of the general population in China. The relevant departments should pay attention to the mental health of rural residents and implement targeted mental health prevention and intervention measures during the epidemic situation.

**Keywords:** corona virus disease 2019, rural residents, anxiety, Hunan (South China), COVID-19

## INTRODUCTION

Since December 2019, coronavirus disease 2019 (COVID-19) epidemics have appeared around the world, starting in Wuhan, Hubei Province, China (1). As of October 4, 2020, the total number of confirmed cases worldwide was 34,804,348, with 1,030,738 cumulative associated deaths (2). The total number of confirmed cases in China was 85,470, with 4,634 deaths (3). It has had a considerable impact and caused psychological strain among Chinese people.



Without doubt, the COVID-19 epidemic is a global public health problem that poses a serious threat to the global society, economy, and human health. The cognitive—phenomenological—transactional model proposes that stress is generated through the specific relationship between the individual and the environment. The individual continually recognizes and evaluates stimuli in a stressful environment, and undergoes physical and psychological changes to adapt to the needs of the environment (4). Therefore, in the face of an epidemic, different groups of people will have different levels of anxiety, fear, helplessness, and even impulsive and irritating behaviors (5). Many studies have shown that mental health problems could occur in both medical staff and severe acute respiratory syndrome (SARS) survivors during the SARS epidemic (6–9). Previous studies of Middle East respiratory syndrome also reported similar results (10, 11). Researchers have conducted many surveys on the psychological status of people during the COVID-19 epidemic, but most of them have concentrated on special groups such as patients with COVID-19 (12, 13), medical staff (14–16), or susceptible groups such as the elderly (17), children (18), and students (19). There are few studies on the psychological status of residents, especially rural residents. Rural areas have become extremely challenging for epidemic prevention and control because of various factors such as shortages of medical resources, insufficient public protection capabilities, and population migration caused by the return of migrant workers to their hometown (20). Previous research found that rural residents have poorer mental health compared to urban residents (21), and anxiety is one of the main problems affecting the mental health of rural residents (22). Hubei was the first and most severely affected province in the epidemic. As its neighboring province, Hunan Province is more likely to be exposed to suspected or infected cases than other regions, which increases residents' psychological pressure and anxiety. This study investigated the anxiety status of rural residents in Hunan during the COVID-19 epidemic and analyzed its influencing factors, intending to provide a scientific basis for effective psychological intervention for rural residents in Hunan.

## METHODS

### Study Design and Sample

A cross-sectional study was conducted among rural residents in rural areas of Hunan Province, China, from February 26–29, 2020. The inclusion criteria were as follows: (a) living in the rural areas of Hunan Province during the COVID-19 epidemic; (b) aged 18 years or older; (c) proficient in WeChat and online questionnaires; and (d) were conscious and volunteered for the study. The exclusion criteria were as follows: participants with psychosis or severe mental disorders and inadequate communication ability.

Ethical approval was obtained from the ethics committee of Central South University (No: E202020) before data collection.

### Measures

*Socio-demographic characteristics* were measured using a self-designed questionnaire, including gender, age, occupation,

residence, marital status, relevant knowledge of COVID-19 (understanding relevant knowledge or not, channels of knowledge acquisition), health status (temperature, self-rated health status, history of contact with Wuhan within the previous half month, and history of exposure to potentially infected people), level of concern about the epidemic, and self-rated impact of the epidemic on one's life.

*Anxiety status* was determined using the self-rating anxiety scale (SAS) (23). The scale consists of 20 items and aims to assess respondents' subjective symptoms. Each item was evaluated on a four-point Likert scale ranging from 1 ("little or none of the time") to 4 ("most of the time"), with higher scores indicating higher levels of anxiety. The Cronbach's alpha for the total scale was 0.864, and it has good reliability and validity, and has been widely used in clinical research (24). According to the Chinese norm (25), the standard score has a cutoff value of 50, 50 to 59 represents mild anxiety, 60 to 68 represents moderate anxiety, and 69 points and above represents severe anxiety.

## Statistical Analysis

### Sample Size

We selected 18 possible influencing factors through a literature review. According to the principle that the sample size should be 5 to 10 times the number of independent variables, the estimated minimum sample size was 180; considering a likely attrition rate of 10% and sampling error, the final required sample size was 200.

### Quality Control

This survey used an online questionnaire. The questionnaire could only be submitted after it had been completed and each IP address could only answer once to avoid repeated answers. In addition, real-time background monitoring was performed to ensure data reliability. To prevent possible bias, a uniform guideline was used on the front page of the questionnaire to explain the completion requirements.

### Data Analysis

Data analysis was performed using SPSS 18.0. Results are expressed as mean  $\pm$  standard deviation ( $X \pm S$ ) or number (%). First, descriptive analyses were conducted to describe the demographic characteristics, relevant knowledge of COVID-19, and health status in rural residents in Hunan during the epidemic. Second, *t*-tests and one-way analysis of variance were used to analyze the anxiety levels of residents with different characteristics. Third, a *t*-test was used to compare the anxiety scores between rural residents in Hunan during the epidemic and different populations in different periods. Fourth, hierarchical regression analysis was performed to explore potential factors influencing residents' anxiety in Hunan during the COVID-19 epidemic. *P*-values  $< 0.05$  were considered statistically significant (2-sided tests).

## RESULTS

We collected 200 questionnaires in the rural areas of 45 townships in 15 regions in Hunan Province. After checking each item one by one, a total of 21 questionnaires with high



consistency of answers or answering time of <150 s were excluded, and 179 valid questionnaires were obtained. The response rate of the questionnaire was 89.5%.

As shown in **Table 1**, most participants were living with their spouse or family and only a few lived alone (5.6%). Most participants had relevant knowledge of COVID-19 (93.9%), and official platforms were their main channels for acquiring knowledge (76.5%). Most participants expressed concern about this epidemic (93.9%), and only 3.9% of them self-rated that the epidemic did not affect their lives. Among them, 32 of the 179

participants (17.88%) had anxiety; specifically, 26 participants had mild anxiety, five participants had moderate anxiety, and one participant had severe anxiety.

## Scores of Anxiety Levels of Rural Residents in Hunan During the COVID-19 Epidemic

As shown in **Table 2**, the mean anxiety scores of rural residents in Hunan during the COVID-19 epidemic was  $40.93 \pm 9.36$ , which

**TABLE 1** | Analysis of anxiety levels of people with different characteristics in Hunan rural residents during the epidemic of COVID-19.

Variable		N	%	Mean (SD)		F/t	P
Sex	① Male	55	30.7	40.77 ± 9.67	① < ②	0.022	0.882
	② Female	124	69.3	40.99 ± 9.26			
Age	① 18 ~ 29y	63	35.2	40.00 ± 9.14	① < ② ③ < ④	0.346	0.792
	② 30 ~ 39y	52	29.1	41.63 ± 8.89			
	③ 40 ~ 49y	36	20.1	41.04 ± 10.83			
	④ ≥ 50y	28	15.6	41.56 ± 8.99			
Marital status	① Married	127	70.9	41.43 ± 9.41	② < ①	1.241	0.267
	② Unmarried	52	29.1	39.71 ± 9.21			
Educational level	① Junior high school and below	69	38.5	41.88 ± 8.93	② < ① ③ < ①	1.036	0.357
	② High school	61	34.1	39.57 ± 8.74			
	③ Bachelor degree or above	49	27.4	41.28 ± 10.62			
Residential status	① Living alone	6	3.4	39.38 ± 8.83	③ < ② ② < ①	0.200	0.819
	② Living with spouse or family	169	94.4	41.04 ± 9.43			
	③ Living with friends or others	4	2.2	38.75 ± 8.60			
Know relevant knowledge of COVID-19	① Yes	168	93.9	41.02 ± 9.53	② < ①	0.255	0.614
	② No	11	6.1	39.55 ± 9.36			
Main channels for acquiring relevant knowledge	① Official platform	137	76.5	40.60 ± 9.41	① < ② ③ < ②	1.070	0.363
	② Unofficial platforms	32	17.9	41.91 ± 9.77			
	③ Others	9	5.0	40.69 ± 6.41			
	④ No knowledge of relevant information	1	0.6	56.25			
Contacted with the people have been to Wuhan within half a month	① Yes	10	5.6	44.00 ± 10.01	② < ①	1.141	0.287
	② No	169	94.4	40.75 ± 9.32			
Going out or gathering within half a month	① Yes	38	21.2	42.34 ± 9.70	② < ①	1.090	0.298
	② No	141	78.8	40.55 ± 9.26			
Wearing a mask when going out	① Yes	171	95.5	40.88 ± 9.47	① < ②	0.085	0.771
	② No	8	4.5	41.88 ± 7.13			
Adequate masks at home	① Yes	99	55.3	40.44 ± 8.90	① < ②	0.598	0.440
	② No	80	44.7	41.53 ± 9.92			
Self-rated of health status	① Very good	135	75.4	39.73 ± 8.65	① < ② <sup>*</sup> ② < ③ <sup>*</sup> ③ < ④ <sup>*</sup>	4.477	0.005 *
	② Good	34	19.0	43.16 ± 10.27			
	③ Fair	8	4.5	48.90 ± 11.72			
	④ Poor	2	1.1	51.88 ± 2.65			
Level of concern about the epidemic	① Not at all concerned	11	6.1	35.34 ± 7.83	① < ② <sup>*</sup> ② < ③ <sup>*</sup>	3.622	0.029 *
	② Had some concerns	100	55.9	40.29 ± 9.02			
	③ Very worried	68	38.0	42.78 ± 9.71			
Self-rated of the impact of the epidemic on life	① Not affected	7	3.9	35.54 ± 9.10	① < ② <sup>*</sup> ② < ③ <sup>*</sup>	3.408	0.035 *
	② A little bit affected	88	49.2	39.72 ± 8.22			
	③ Very affected	84	46.9	40.93 ± 9.36			

\* $P < 0.05$ .

was higher than the rural residents' anxiety scores during the non-epidemic period ( $t = 14.820, P < 0.001$ ), which was also higher than the anxiety scores of healthy Chinese individuals during the non-epidemic period ( $t = 55.098, P < 0.001$ ). However, compared with the anxiety scores of rural residents across China during the epidemic, rural residents in Hunan had lower anxiety scores ( $t = -4.375, P < 0.001$ ). In terms of anxiety detection rate, only the difference between rural residents in Hunan during the epidemic and healthy people before the epidemic was statistically significant ( $\chi^2 = 6.644, P = 0.010$ ).

### Factors Influencing Rural Resident' Anxiety in Hunan During the COVID-19 Epidemic

The results showed that self-rated health status, level of concern about the epidemic, and self-rated impact of the epidemic on one's life had statistically significant effects on anxiety scores ( $P < 0.05$ , as shown in Table 1).

### Hierarchical Regression Analysis of the Influencing Factors of Rural Residents' Anxiety Score in Hunan During the COVID-19 Epidemic

Hierarchical regression analysis was used to analyze whether the gradual addition of self-rated health status, level of concern about the epidemic, and self-rated impact of the epidemic on one's life could improve the model's prediction level of the standard anxiety score.

The final model included three variables: self-rated health status, level of concern about the epidemic, and self-rated impact of the epidemic on one's life, which was statistically significant,

$R^2 = 0.113, F(3, 175) = 7.465 (P < 0.001)$ , adjusted  $R^2 = 0.098$ , which explained 11.3% of the total variation in the anxiety scores of rural residents in Hunan during the COVID-19 epidemic.

Self-rated health status was added into Model 1 and the  $R^2$  value of Model 1 was 0.070,  $F(1, 171) = 13.304 (P < 0.001)$ . After adding level of concern about the epidemic, the  $R^2$  value of Model 2 increased by 0.035,  $F(1, 176) = 6.890 (P < 0.01)$ , which was statistically significant. Based on Model 2 and adding self-rated impact of the epidemic on one's life, the  $R^2$  value of Model 3 increased by 0.009,  $F(1, 175) = 1.678 (P = 0.197 > 0.05)$ , which was not statistically significant. The specific results are shown in Table 3.

## DISCUSSION

### Anxiety Status of Rural Residents in Hunan During the COVID-19 Epidemic

The results of this survey show that the anxiety score of rural residents in Hunan during the COVID-19 epidemic was higher than that of healthy Chinese (26) and rural residents across China (27) during the non-epidemic period. Our research found that the detection rate of anxiety among rural residents in Hunan was 17.88%, while one Turkish study reported that the detection rate of anxiety in people was 45.1% (28) while a study on American adults found a rate of 38.41% (29). The reason for this difference may be that our research was carried out in February, while their research was mainly carried out in April 2020. At this time, COVID-19 was spreading around the world and the epidemic was worsening. Due to the strong contagion, long incubation period, wide spread, and rapid progress of COVID-19, the epidemic seriously threatens

**TABLE 2 |** Comparison of the anxiety level of rural residents in Hunan during the epidemic and different populations in different periods.

	Total number of sample	Mean (SD)	t	P-value	Number of anxiety detected (%)	$\chi^2$	P-value
Anxiety level of residents in different regions during the epidemic			-4.375	<0.001		3.708	0.054
	Rural residents in Hunan Province	179 40.93 ± 9.30			32(17.9)		
	Rural residents across China	1,029 43.99 ± 8.55			398(38.7)		
Anxiety level of rural residents in different periods			14.820	<0.001		0.730	0.393
	During the epidemic	179 40.93 ± 9.30			32(17.9)		
	During non-epidemic period	778 30.56 ± 5.94			119(15.3)		
Anxiety level of rural residents in Hunan Province during the epidemic and healthy people during non-epidemic period			55.098	<0.001		6.644	0.010
	Rural residents in Hunan province during the epidemic	179 40.93 ± 9.30			32(17.9)		
	Healthy people during non-epidemic period	1,158 29.78 ± 10.07			129(11.1)		

**TABLE 3 |** Hierarchical regression analysis of the influencing factors of rural residents' anxiety score in Hunan during the epidemic of COVID-19.

Variables	Model 1		Model 2		Model 3	
	B	Standardized coefficients B	B	Standardized coefficients B	B	Standardized coefficients B
Interpolation	35.612***		28.732***		26.652***	
Self-rated of health status	4.050***	0.264	3.997**	0.262	3.935***	0.257
Level of concern about the epidemic			2.997**	0.187	2.032	0.127
Self-rated of the impact of the epidemic on life					1.810	0.110
$R^2$		0.070		0.105		0.113
$F$		13.304***		10.319***		7.465***
$\Delta R^2$		0.070		0.035		0.009
$\Delta F$		13.304***		6.890**		1.678

$N = 179$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .

people's health and safety, and people will inevitably experience negative emotions such as anxiety and fear when facing the epidemic (30). However, it is worth mentioning that because of the specific geographical location of Hunan (near Hubei Province, the province where the epidemic first broke out), before the survey, researchers predicted that rural residents in Hunan Province may have higher levels of anxiety, but our results show that during the COVID-19 epidemic, rural residents' anxiety scores in Hunan were lower than national rural residents' anxiety scores ( $43.99 \pm 8.55$ ), as investigated by Wang (31). This may be related to the fact that the Chinese government immediately locked down Wuhan and the entire Hubei Province after the outbreak of the epidemic to contain the pandemic, so that the epidemic did not break out in large areas in Hunan Province, and the growth rate of the epidemic gradually decreased; thus, most residents in the vicinity of the epidemic became increasingly confident.

## Factors Influencing the Anxiety of Rural Residents in Hunan During the COVID-19 Epidemic

### Self-Rated Health Status

Residents who considered themselves to be in poor health had higher anxiety scores than residents who considered their health to be good, and their average anxiety score reached the anxiety cutoff. Metacognition theory posits that self-centered consciousness activities are positive feedback and adjustments to consciousness (32). Therefore, residents who believe they are in good health will be confident in resisting attacks of COVID-19, while residents who believe they are in poor health may think they will be more susceptible to the virus and if they are infected, have no confidence in defeating it, so their anxiety scores would be higher than those who think they are in good health. Studies (33, 34) have shown that emotional therapy has a positive effect on easing the public's negative emotions during the epidemic; therefore, self-positive suggestion may relieve residents' anxiety.

### Level of Concern About the Epidemic

The higher their level of concern about the epidemic, the higher the residents' anxiety score. Studies by Li (35) and Zhang (24) also showed that the degree of concern about the epidemic is a factor influencing anxiety among different groups of people during the COVID-19 epidemic. Several factors are likely to induce anxiety among residents, including the number of confirmed cases and deaths from COVID-19 that continue to rise daily, lack of knowledge of the disease, surrounding people who may have been infected with the virus, and the lack of anti-coronavirus specific drugs (36), among other reasons. Cai (37) believed that during the epidemic, people only know what COVID-19 is but do not know how to control it, which is not sufficient to reduce its effects on their psychological problems. The key is to know how to prevent and control COVID-19. Leung et al. (38) found that publicizing measures for disease prevention and eliminating the spread of rumors can reduce public anxiety. The results of this survey showed that most people acquired relevant knowledge of COVID-19 through an official platform. Therefore, it is necessary to strengthen the dissemination of disease information and prevention measures on official platforms.

### Self-Rated Impact of the Epidemic on One's Life

The greater their self-rated impact of the epidemic on one's life, the higher the residents' anxiety scores. The population density in rural areas is smaller than that in cities or towns, and houses are mostly single-family houses, so rural residents can have a wide range of activities in a relatively safe and isolated environment. Some rural residents usually work in fields or farms and rarely go to densely populated areas, so they feel that the epidemic has little impact on their lives and have low anxiety scores. However, some rural residents need to go to cities to earn a living or need to be in contact with others at work; during the epidemic, their financial and living pressures have greatly increased due to work restrictions, so their anxiety scores are high. For these individuals, it is necessary to actively solve practical problems such as the delayed resumption of work and limited social activities (39).

## LIMITATIONS

Due to the difficulties and limitations in collecting data during the epidemic, random sampling was not conducted in this survey, and the nature of the sample may limit the generalizability of the results. In addition, due to the use of online questionnaires, the survey only included people who can operate WeChat proficiently. Elderly and rural residents who do not use WeChat were not included. Further longitudinal studies should be conducted to better investigate the psychological status of and interventions for rural residents more deeply.

## CONCLUSION

COVID-19 is having a huge impact on the life and the psychology of rural residents in Hunan Province, China. During the epidemic, their anxiety rate was high. This was a particular phenomenon of residents in a specific period; we need to pay enough attention to it and seek positive solutions to deal with it ingeniously. The results showed that self-rated health status, level of concern about the epidemic, and self-rated impact of the epidemic on one's life are the main factors that affect how anxious rural residents are. It is necessary to increase publicity about COVID-19 prevention measures and provide positive psychological guidance to alleviate rural residents' anxiety. Timely announcements about the epidemic, vigorous publicity about epidemic prevention measures, and the support of all sectors of society will give people around the world greater confidence and strength to overcome the epidemic (40).

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## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by The Ethics Committee of the Xiangya Nursing School, Central South University. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

YZ and Y-pC were the primary investigator of the study, did statistical analysis and wrote this paper. JW and YD helped conduct the study and revised the manuscript. DP and LZ helped supervised the survey and checked the data. All authors contributed to and approved the final manuscript.

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# Advancing Computerized Cognitive Training for MCI and Alzheimer's Disease in a Pandemic and Post-pandemic World

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## INTRODUCTION

Worldwide, some 40 million adults have Alzheimer's disease (AD) (1) and several hundred million may be at elevated risk for AD by virtue of mild cognitive impairment (MCI) and/or silent buildup of cortical AD pathology. There are no pharmacological treatments with more than minimal efficacy for mild AD, and prevention strategies are not established.

The COVID-19 pandemic has transformed mobile health applications and telemedicine from nice to have tools into essential healthcare infrastructure (2–13). We anticipate that this need will be particularly great for the elderly who, due to their greater risk for infection, may avoid medical facilities or be required to self-isolate. These are also the very groups at highest risk for cognitive decline. Further, emerging data suggests COVID-19 may itself be linked with longer-term neurological consequences, including cognitive decline (5).

Definitive data on the utility of cognitive/mental wellness tools during the pandemic awaits the results of ongoing clinical trials (6–10), but there is accumulating preliminary evidence (11). For example, during the COVID-19 pandemic, chatbots employed by hospitals and government agencies fielded millions of queries from concerned patients (3). Digital tools also were deployed to provide psychological self-help to people isolated at home or in retirement centers and nursing homes (2–4). A survey of 1,000 adults done in March 2020 (12) found that 82% were concerned about leaving their home, 78% are avoiding doctor visits unrelated to COVID and 80% would prefer to receive a remote virtual health consultation if given the opportunity. A recent survey of elderly MCI subjects during the pandemic (13) demonstrated potential for cognitive stimulation *via* assistive technology but also found that those living alone had the greatest negative mental effects.

## COMPUTERIZED COGNITIVE TRAINING

Computerized cognitive training (CCT) is one such application of digital health in which individuals can access gamified, engaging, cognitive exercises from their own computers or mobile devices anytime anywhere (14–24). These exercises can be targeted to improve overall cognition or specific domains (such as learning and memory, attention, speed, executive functioning), as well as daily living skills such as financial knowledge or driving performance (14–24). They can potentially be adjusted based on response *via* self-administered cognitive tests, and adherence supervised remotely, as needed, by a physician or psychologist (**Figure 1**).

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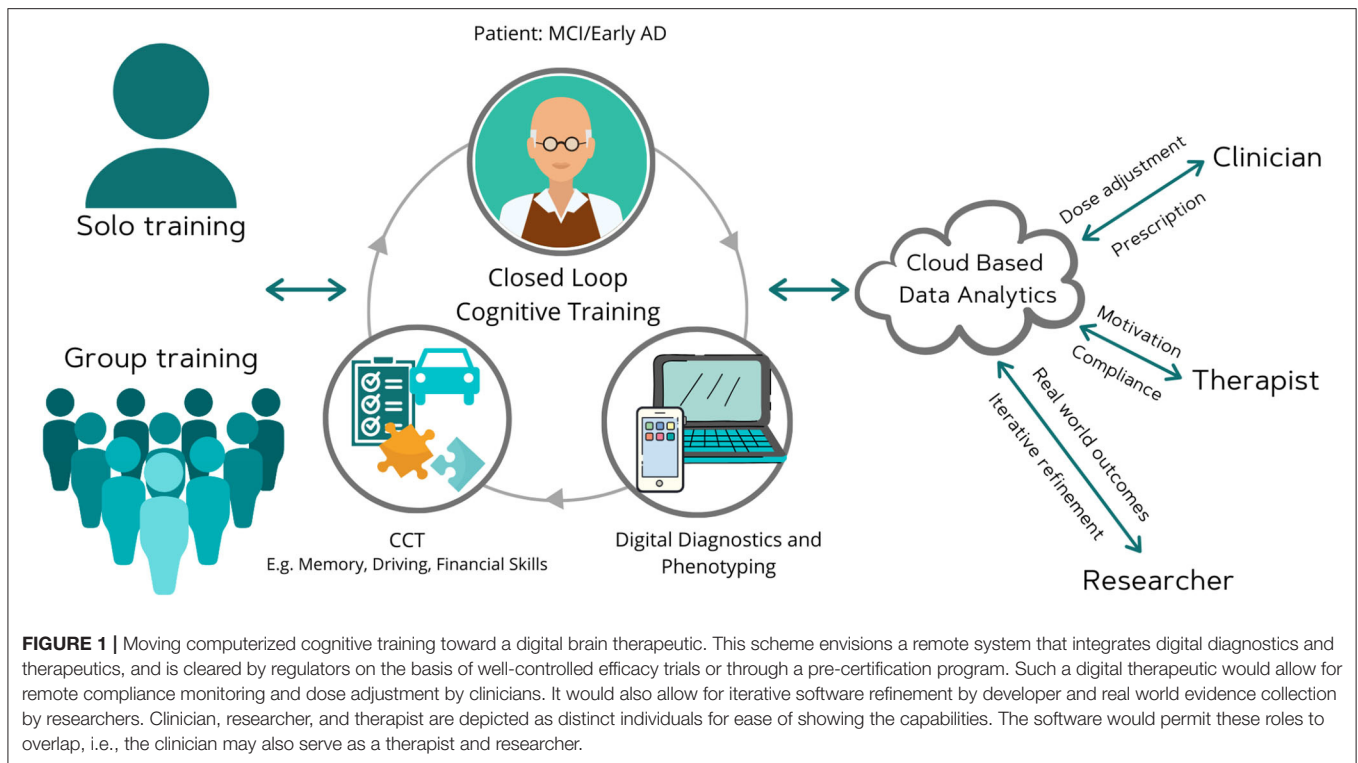
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## CLINICAL TRIALS OF CCT IN AGING AND MCI

While scientific opinion regarding CCT has in the past been divided (15–18), there is now a growing body of evidence (pre-COVID) from pre-clinical and observational research [reviewed in (14, 20–24)] as well as data from large RCTs and meta-analyses to show that certain cognitive training regimens can improve cognitive and functional abilities in older adults (17). For example, the NIH-funded, Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) Trial of 2,832 older people, assigned people to 3 forms of training—memory, reasoning and speed—vs. a control. The memory group showed no benefits. But 5 years after initial training, the reasoning group self-reported fewer daily-living problems, whereas speed-of-processing training resulted in fewer at-fault automobile accidents and a smaller decline in health-related quality of life (21). Further, at 10-year follow up, those on the computerized speed training arm had a 29% reduction in incident dementia rates (22). Likewise, while an initial online study by Owen et al. (18) did not find benefits of CCT in younger adults, a subsequent study of 2,912 older adults by the same group reported that CCT had benefits on both cognition and daily activities (19). A meta-analyses of 52 studies comprising 4,885 cognitively healthy older adults, noted small to moderate beneficial effect sizes for CCT in comparison to control groups in the domains of verbal memory, non-verbal memory, working memory, processing speed, and visuospatial skills (23). This study also found that group-based training was more efficacious than home-based

training—suggesting that future home based CCT may need to be augmented with greater remote supervision and interactions *via* social media (23). A meta-analysis of 18 studies of CCT for MCI ( $N = 690$ ) found small to moderate improvements in global cognition, memory and working memory (20). The largest effect size was on working memory. Whether these improvements result in long-term transfer to clinically meaningful benefits and lowered rates of progression to dementia is not known and require further study (20).

There is also evidence that the effectiveness of CCT in subjects at risk for AD could be improved by supplementing cognitive training with other tools such as physical exercise, diet, vascular risk reduction, neuromodulation or pharmacotherapy. For example, Lenze et al. (25) reported that the addition of a serotonin modulator/stimulator drug, vortioxetine, could improve the efficacy of CCT in MCI. Two studies that examined the effects of combining physical and cognitive training in MCI reported mixed results (24, 26). Singh et al. (24), using a  $2 \times 2$  design, found that CCT improved memory in MCI at 6 months but did not augment the effects of exercise. In contrast, the 40-week population study by Shimada et al. (26) of 945 MCI subjects reported that combined CCT and physical exercise improved memory and non-memory domains, and reduced medial temporal lobe atrophy in amnesic MCI (26). Lastly, the 2-year FINGER randomized controlled trial of 1,260 older adults showed that a multi-domain lifestyle intervention, comprising CCT as one of the components, slowed cognitive decline (27). While the benefits seen in multi-domain intervention studies cannot be attributed solely to CCT, these data, together with data

from monotherapy RCTs, support further development of CCT for cognitive rehabilitation of MCI and early AD.

## ADVANCING CCT AS A DIGITAL BRAIN THERAPEUTIC

The International Medical Device Regulators Forum (IMDRF) for software as a medical device (SaMD) consensus guidelines (28) state that a software intended to treat or prevent a serious disease would have to conduct well-controlled clinical trials to prove efficacy and seek pre-marketing authorization from a regulatory agency. CCT that is marketed for treating MCI or preventing AD would be viewed as a medical device and subject to pre-marketing regulatory oversight. CCT intended for use as a general wellness tool to improve mental speed would likely not be subject to such oversight. Recently, prescription digital therapeutics have been cleared by the US Food and Drug Administration (FDA) for use in substance abuse and sleep disorders, and apps for other diseases are in development (29).

We believe the most efficient regulatory path for CCT is to seek a marketing indication as a prescription digital therapeutic for the symptomatic treatment of MCI or very mild dementia. Such a path would be supported by the large public health threat posed by AD and the urgent need for scalable, low risk, cost-effective, home-based preventive treatments. The small to moderate effect sizes seen in MCI CCT trials to date are likely to be similar to those expected in ongoing anti-amyloid or anti-tau trials. Further, the safety of CCT is superior to most biologics/drugs being studied for MCI and the risk is minimal.

Recent FDA draft guidelines for acceptable outcomes in early AD trials of investigational drugs (30) provide a roadmap for CCT. The FDA guidance categorizes early AD into three stages—Stage 1 (pathological changes but no clinical deficits), Stage 2 (mild cognitive deficits but no measurable functional deficits), and Stage 3 (measurable cognitive and functional deficits). Stages 2 and 3 are analogous to early MCI and late-MCI. The FDA guidance suggests that in Stage 1 one or more biomarkers could serve as a primary basis for accelerated approval with the requirement for a post-approval confirmatory clinical study. In Stage 2, one or more neuropsychological tests (either effect on multiple tests or a large effect on a single test) could serve as the basis for approval. In Stage 3, a single integrated scale that measures both daily function and cognitive effects (e.g., Clinical Dementia Rating Scale) could serve as evidence of efficacy.

CCT manufacturers should seek advice from regulatory agencies and/or utilize the FDA's digital software pre-certification (Pre-Cert) program. In the US, given the lack of a predicate or product code, CCT for MCI would likely be viewed by the FDA as a Class III device (31); however, we believe that a *de-novo* application to request re-classification of CCT as a lower risk Class II device could be successful. If regulatory agencies view the existing studies of CCT in aging and MCI [such as those cited in (14–26)] as supportive, then only a single, methodologically rigorous, relatively short (e.g., 24-week) trial may be needed to gain such an indication. Alternatively a regulatory quality trial could also be conducted in the public interest through a public-private partnership involving one or

more CCT companies or *via* a government grant. For example, our group is currently conducting an 18-month randomized trial of CCT vs. active control in carefully selected MCI patients with clinically meaningful cognitive (ADAS-Cog), functional (FAQ, UPSA), neuronal loss (hippocampal volume) and disease modifying (progression to dementia) outcomes (32).

Given the millions of elderly already doing CCT at home, it would also be insightful to analyze existing large registries to examine real world outcomes consistent with the FDA's total product lifecycle approach (31). Three areas of real world health analytics (RWHA) would be relevant for CCT—(1) patient reported outcomes such as daily activities; (2) user experience analytics such as engagement and compliance; (3) product performance (reliability, privacy, and cybersecurity). Updates on real world performance could be provided quarterly to public and regulators. Databases from large published RCTs (14–26) could be made available for such purpose with data sharing principles similar to the Dementias Platform UK or Alzheimer's Disease Neuroimaging Initiative (14, 33). The Human Cognition Project is one such CCT database that has already yielded useful insights and accessed by several academics (14, 34).

There are numerous CCT programs available on the market as wellness tools but none are currently cleared by regulators as a medical device and hence it is difficult for consumers and clinicians to choose among them. Regulatory clearance would increase trust and allow for greater scaling as a clinician supervised digital therapeutic (**Figure 1**). Future research to clarify the role of augmenting agents, such as off-label medications (e.g., vortioxetine), cholinesterase inhibitors, physical exercise, and other non-pharmacologic interventions, for CCT to achieve maximum efficacy as a cognitive enhancing strategy would also be useful. Future studies could also examine its utility in combination with anti-amyloid or anti-tau agents.

The COVID-19 pandemic has illustrated the demand for digital tools across the entire spectrum of healthcare. Ongoing studies are testing the utility of CCT for elderly subjects during the COVID pandemic (6, 31). For example, the TV-AssistDem a European multicenter randomized controlled trial evaluating a digital technology-based assistive integrated service to provide social connectedness and memory stimulation for MCI has rapidly adapted to the pandemic. Globally, reimbursement and regulatory burdens faced by digital tools before the pandemic have begun to diminish. The optimal features needed post-pandemic are difficult to predict at this time but hybrid models of home-based, tele-medicine and clinical based care will likely become the norm. Companies that integrate digital therapeutics with other modalities (e.g., digital diagnostics, digital pharmacy, live consults *via* tele-medicine) will best provide a seamless experience for consumers. Further, as our figure illustrates, features such as ease of use and ease of trouble shooting minimal supervision or ability to supervise by a caregiver, smooth integration with clinical medical record, remote access to results by doctors and therapists/psychologists for treatment monitoring, real time patient feedback, self-rated outcomes and real world analytics to track progress, and affordability would make it attractive to elderly in a post-pandemic situation. A patient-centered, real world health data sharing platform that can collect and aggregate siloed data sources across multiple health

systems has recently been demonstrated (35). These lessons are highly relevant to optimize CCT as a clinical tool in MCI.

In summary, we believe that it is an important time for the field to advance CCT from a wellness product to a well-integrated, digital brain therapeutic platform *via* an appropriate regulatory pathway to help millions of elderly both during pandemics and in normal times.

## AUTHOR CONTRIBUTIONS

KB and PD drafted the study. TG and DD provided critical edits. All authors helped with data interpretation.

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# Moving Toward Telehealth Surveillance Services for Toddlers at Risk for Autism During the COVID-19 Pandemic

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Since 2016, the project “Early Bird Diagnostic Protocol for Autism Spectrum Disorders (ASD)” funded by the Italian Ministry of Health has been operative at IRCCS Fondazione Stella Maris (FSM), Pisa (IT), with the main aim of developing early age-specific diagnostic protocols by longitudinally enrolling two different populations at risk for ASD: (i) toddlers with older siblings with ASD (FR) and (ii) toddlers referred by a child psychiatrist or pediatrician for suspected ASD (CR). On January 30, 2020, when the World Health Organization declared the outbreak of coronavirus disease 2019 (COVID-19), 136 patients (85 FR; 51 CR; 93 males; 43 females) had been enrolled in the project with 324 completed time points and 64 still missing. Considering both the huge psychological burden on families with toddlers at risk for ASD during the lockdown and the longitudinal studies reporting the positive “surveillance effect” in terms of a better outcome in at-risk toddlers, our priority has been to maintain regular contact and support to enrolled families. To do this, the research team, being authorized for smart-working research activities, has set up a detailed remote surveillance protocol (RSP). The RSP includes three online interviews and one online video registration of parent–child play. In the current community case study, the authors report the telehealth procedure and discuss possible future directions in developing remote assessment and new evaluation modalities for ecological parent–child play video recordings in at-risk populations. Hopefully, the surveillance protocol will further improve our ability to detect risk and activate early tailored intervention.

**Keywords:** autism spectrum disorders (ASD), coronavirus disease 2019 (COVID-19), public mental health, neurodevelopment, early identification, telehealth

## INTRODUCTION

With an estimated prevalence of one in 87 children aged 7–9 years in Italy (1), autism spectrum disorders (ASD) are increasingly perceived as a public health priority, with a significant individual, familial, and societal burden, both emotional and economic. The phenotypic expression and the detrimental impact of ASD could be mitigated through early identification and intervention prior to the emergence of full-blown symptoms. Current literature, in fact, suggests that (i) it is possible

to detect ASD starting from 14 months of age in at least a certain proportion of children (2); (ii) very young children benefit from early intervention (EI), especially when parents are actively involved in the rehabilitation process (3); and (iii) intervention should be initiated as soon as possible, when signs of ASD risk appear (4). Based on these three assumptions, since 2016 the project “Early Bird Diagnostic Protocol for Autism Spectrum Disorders” (EARLY BIRD; NET-2013-02355263-3) funded by the Italian Ministry of Health has been operative at IRCCS Fondazione Stella Maris (FSM), Pisa (IT), a tertiary-care University hospital that receives patients from all over Italy. This project aimed to develop, through longitudinal clinical monitoring and planned time points, age-specific diagnostic protocols able to detect (i) risk for ASD at 12 months of age; (ii) provisional diagnosis of ASD at 18 months of age; and (iii) stable diagnosis according to the diagnostic criteria of the DSM-5 (5) at 24 months of age. In addition, a clinical follow-up is scheduled at 30 months of age, to confirm the diagnosis or exclude it definitively. Children whose evaluations suggest a diagnosis of autism are referred to their local Child and Adolescent Mental Health Services (CAMHS) for early intervention.

A team of psychologists and child psychiatrists with many years of clinical and research experience in the ASD Unit of the FSM are in charge of the EARLY BIRD surveillance protocol of two different at-risk populations: (i) toddlers with older siblings with ASD (familial risk toddlers: FR), who are vulnerable to ASD and, more broadly, to psychiatric and neurodevelopmental disorders (6, 7) and (ii) toddlers clinically referred (CR) for suspected ASD by a child psychiatrist or pediatrician.

From September 2016 to January 2020, 136 children (85 FR; 51 TR; 93 males; 43 females) were enrolled in the study (see **Table 1**). A total of 106 subjects (FR: 58; CR: 48) have completed the diagnostic protocol, while 30 (FR: 27; CR: 3) are still being monitored. As part of the EARLY BIRD project, we completed 324 time points of the children enrolled, while 64 are still missing (5 at 12 months; 11 at 18 months; 18 at 24 months; 30 at 30 months).

In its original form, the EARLY BIRD surveillance protocol was conceived as a 2-day assessment of cognitive functioning, adaptive functioning, and social and communicative functioning, through standardized tests and interviews [Griffiths Mental Developmental Scales-ER (8), Vineland 2 (9), ADOS-2 (10), ADI-R (11)]. In addition, other information on each child’s development was collected through parental questionnaires and clinical interviews (12–23) (see **Table 2**).

On January 30, 2020, the World Health Organization declared the outbreak of coronavirus disease 2019 (COVID-19) a public health emergency of international concern (24).

Emerging evidence reports the hard situation in which parents have been put during this unpredictable stressful situation, potentially impairing their ability to be supportive caregivers (25). Indeed, parents, especially those with young children, have to suddenly cope with closure of the kindergartens, worries over health and finances, the necessity for quick adaptation to “smart-working” at home, isolation, lack of support from grandparents, and bans on going to parks or other public spaces. Parents of toddlers at risk for ASD are even more exposed to stress,

experimenting with concern that their child might have atypical development can impact family well-being and increase parents’ risk of depression, ruminative thought, anxiety, or other types of psychological distress (26). In addition, stressful factors can interfere with early dyadic interaction between at-risk infants and their caregivers and, ultimately, play a detrimental role in children’s longer-term social functioning and outcome (27). Some interesting suggestions about coping with young children with ASD in “stay at home period” are reported in Narzisi (28).

Coping difficulties may have even greater repercussions in families with infants who have an older sibling already diagnosed with ASD. Indeed, it is reported that caregivers of children with ASD have a higher risk of decreased family cohesion, depression, anxiety, somatic complaints, and burnout in comparison to caregivers of children with other developmental disabilities (29–32).

For all these reasons, our priority has been to maintain regular contact and support the families whose child was being followed in his developmental trajectory by the multidisciplinary team, in order to continue the active surveillance of toddlers at risk for ASD during the COVID-19 crisis. Indeed, a recent review of longitudinal studies on FR toddlers reported that the prospective follow-up strategy improves their developmental outcome, creating a sort of “surveillance effect” through which parents, who have the possibility to talk regularly about their child’s development with clinical experts, can learn new strategies to interact with their high-risk infants, reducing, in turn, their symptom severity (33).

Despite technological tools and facilities (such as smartphones, tablets, PC, and wi-fi connections) spread and used among populations, there is little use for telehealth-based assessments of clinical conditions, including ASD, as recently systematically reviewed in Dahiya et al. (34). Obviously, the final goal consists of reaching the same percentage of success of the “in-person” assessment.

In a recent contribution, Juarez et al. (35) analyzed the accuracy of a remote diagnostic assessment for high-risk infants in the second–third year of life (the diagnosis was later confirmed with an *in-person* visit), using a remote video-analysis of a screening tool—the STAT (36–38). Despite that this diagnostic procedure succeeded in 62% of cases and the procedure was well-accepted by parents, this was still dependent on the “physical” presence of a trained person who could administer the screening tool. On the contrary, Smith et al. (39) validated a novel remote procedure for ASD symptom assessment, where parents were instructed to elicit and record specific target behaviors in different scenarios, comparing it with an *in-person* assessment. Results indicated a high agreement (88.2%) between the two modalities as well as high sensitivity (84.9%) and high specificity (94.4%). Following the same line, Sutantio et al. (40) found a good level of agreement (82%) between parents’ video recording, based on a given specific protocol, in three different home settings and a direct assessment conducted by an expert clinician.

In another study (41), Fusaro and colleagues interestingly examined the potential of applying the ADOS-G (42) protocol to unstructured homemade videos collected via the YouTube platform. They found that the ADOS-G-based video analysis



**TABLE 1** | Number of subjects at each time point (TP) are divided into completed (COM) and planned (PLA) protocol.

	Subjects		Total TP		12 m		18 m		24 m		30 m	
	COM	PLA	COM	PLA	COM	PLA	COM	PLA	COM	PLA	COM	PLA
CR	48	3	106	3	4	0	29	0	41	0	32	3
FR	58	27	218	61	57	5	61	11	55	18	45	27
TOT	106	30	324	64	61	5	90	11	96	18	77	30

CR, Clinical referral; FR, familial risk; TOT, Total.

achieved a classification accuracy of 96.8, 94.1% of sensitivity, and 100% of specificity.

All these studies revealed that parents are capable of collecting appropriate examples of target behaviors of their children, especially when properly guided, and that these homebased procedures might improve the ecological validity of a diagnostic assessment (43). For this reason, we decided to adapt our original surveillance protocol to a remote procedure, aiming firstly to support families during the pandemic period and to provide, when necessary, feedbacks and advice on how to support child development or helping families to create a fast link to the local CAMHS.

Our efforts have been focused on instructing families on how to collect as much meaningful information as possible and to record an appropriate video recording of children’s behavior. For this reason, differently from the previous studies on this topic, we have decided to be virtually present during the video recording, to promptly encourage parents to acquire appropriate examples of target behaviors.

This “perspective” paper describes how the protocol, already in use within the EARLY BIRD project, has been rethought and readjusted to be used remotely following the guidelines of health authorities, local governments and the World Health Organization in the COVID-19 era.

### Remote Surveillance Protocol

The research team consists of three psychologists (V.C., F.A., and N.C.) and two child neurologists and psychiatrists (A.M. and R.T.). Due to the lockdown, all researchers have been authorized to continue activities in smart-working.

The team meets via video conference twice a week to discuss ongoing updates and issues, sharing the documents and materials for the remote surveillance protocol RSP within a shared folder on the cloud.

The RSP includes three online interviews and one online video registration of parent–child interaction in a playful setting, for a total of four online sessions. A preliminary telephone call is planned to inform families about the adapted telematic procedure and accept or decline participation. Afterward, caregivers who decide to participate in the remote evaluation fill in written informed consent procedures in compliance with institutional review board standards. Once informed consent has been acquired by the research team, parents are administered the following questionnaires by research assistants.

Detailed instructions on how to prepare the play area for the video recording are also provided. A minimum level of

**TABLE 2** | The questionnaires administered to parents at each time point of the EARLY BIRD surveillance protocol.

	Time points (age of the child)			
	12 months	18 months	24 months	30 months
M–CHAT (12)	█	✓	█	█
RBS–R (13, 14)	█	✓	✓	✓
CBCL 1.5-5 (15)	█	✓	✓	✓
ITSEA (16)	✓	✓	✓	✓
FYI (17)	✓	█	█	█
CDIs (18)	✓	✓	✓	✓
LUI (19)	█	✓	✓	✓
EMQ (20)	✓	✓	✓	✓
PSI III (21)	✓	✓	✓	✓
QUIT (22)	✓	✓	✓	✓
SP (23)	✓	✓	✓	✓

CBCL 1.5-5, Child Behavior Checklist; CDIs, MacArthur–Bates; Communicative Development Inventories; EMQ, Early Motor Questionnaire; FYI, First Year Inventory; ITSEA, Infant–Toddler Social and Emotional Assessment; LUI, Language Use Inventory; M-CHAT, Modified Checklist for Autism in Toddlers; PSI III, Parenting Stress Index, Third edition; QUIT, Italian Questionnaires of Temperament; RBS-R, Repetitive Behavior Scale-Revised; SP, Sensory Profile.

structure (e.g., in the selection of toys) is required in order to obtain informative video material, sufficiently comparable across children (44, 45).

### First Online Session

The psychologist and the child psychiatrist meet the parents online to record 15 min of parent–child play. Parents are encouraged to resolve any doubts about the setup of the video registration before starting, taking advantage of the researchers’ help. A picture of the setting is taken in order to facilitate the replicability of the video recording at future time points. Researchers follow the recording in “mute option,” intervening only if necessary, to ensure the visibility of both parent and child.

In the days following the first session, the video is viewed and discussed by the researchers, focusing on those behaviors, included in the ADOS-2 Toddler Module (46) diagnostic algorithm, that does not need to be elicited by an adult: overall quality of the social overtures, eye contact, use of gestures to communicate, language level and prosody, play variety, joint attention behaviors, facial expressions, presence of unusual sensory interests, presence of repetitive movements and presence

of restricted and repetitive patterns of behaviors and interests, and presence of other problematic behaviors. At the end of the discussion, a clinical hypothesis on the risk for ASD is made, as a starting point to be further examined during the following two sessions.

### Second Online Session

An anamnestic interview or an anamnestic update is collected. Researchers also discuss with parents any concerns and information that emerged from questionnaires. Parents are asked to report recent auxological parameters (height, weight, and head circumference) as well as other general health status information. Vineland-II interview (9) with one parent is also carried out.

### Third Online Session

The Socio-emotional Bayley III (47) interview is administered to parents along with a non-structured interview focused on age-appropriate behavioral risk signs for ASD or with the ADI-R (48) (in the case of toddlers older than 24 months). Further information on the developmental level of the infant is collected through a non-structured interview based on the developmental milestones of play skills.

After the third session, the clinical-research team meets to discuss the information collected from the interviews and parental questionnaires, in order to decide if the child needs additional assessments to further investigate any causes for concern, which may have arisen. If not, the child will be evaluated again at his next time-point.

### Fourth Online Session

The last session with parents includes feedback on the evaluations and discussion about developmental issues (if present). The appointment for the next time-point is then scheduled. Parents are also asked to compile a questionnaire to collect feedback on the remote procedure they have used including suggestions for improving the service.

If any kind of diagnosis or a consistent risk for ASD is hypothesized at one of the planned time points, the child's parents will be informed. At the same time, the local CAMHS will be contacted in order to start as soon as possible an early treatment tailored to specific strengths and challenges of the child.

A schematic representation of RSP is reported in **Figure 1**.

## CONSIDERATIONS

Lockdown, which is often an unpleasant experience due to isolation, uncertainty about health and economical status with extensive effects on the general population (49), could have even worse consequences in those families with concerns about their child's development, thus forcing health workers to find out alternative remote strategies to keep in touch with them.

Preexisting evidence was already available about remote modality application in the ASD field either in assessment or in rehabilitation programs (34, 50), and during the COVID-19 emergency, the role of remote assistance in children with special needs has been even more stressed (51, 52).

The adaptation of the Autism Surveillance protocol reported here was systematized by the research team within the first few weeks of the Italian lockdown in order to do the following:

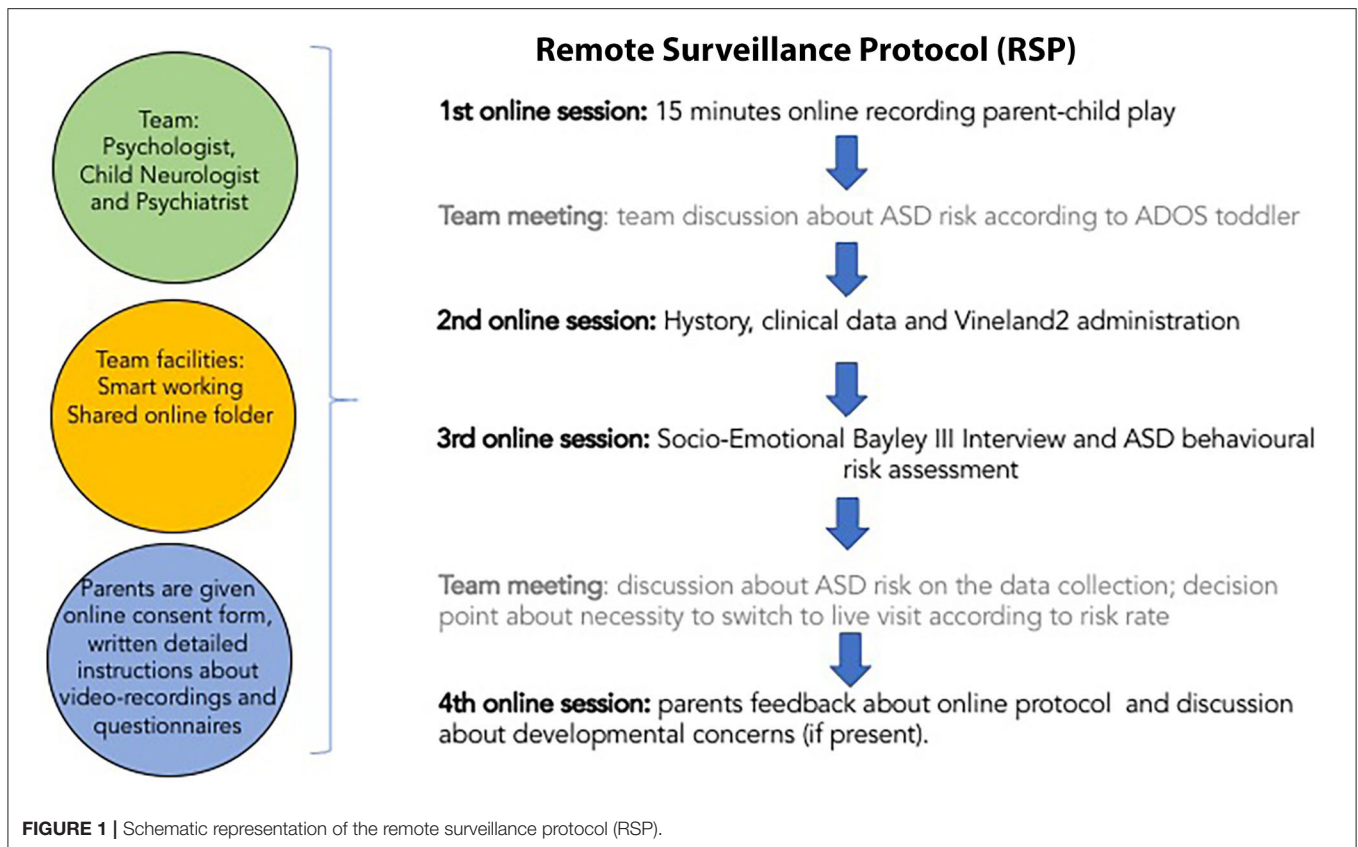
- (1) maintain regular contact and support families involved in the longitudinal surveillance of their FR or CR toddler's development;
- (2) evaluate the feasibility of an online surveillance protocol for toddlers at risk for autism and obtain evaluations at the time-points established by the project; and
- (3) assess the level of compliance and satisfaction on the part of the families with regard to this new telematic protocol.

The current procedure emerged from multiple discussions among professionals with long experience in the field of early typical and atypical development. The main aim was to be able to perform an assessment, which was as structured and standardized as possible. One of the first challenges met was the impossibility to conduct a remote assessment of ASD symptoms and cognitive development using standardized tests such as the ADOS-Toddler and the Griffiths Mental Developmental Scales. To assess the child's spontaneous social behavior, a video depicting the child in interaction with the parent was collected. One of the most debated points regarding the procedure for the video registration was the level of structure. If, on the one hand, we wanted to collect clinically useful information, we did not want to stress parents by asking them to try to elicit particular behaviors (e.g., response to joint attention and imitation skills) as if they were clinicians. For this reason, we chose to ask parents to play with their child as they would naturally, but requested them to provide a specific selection of toys among those available in their house in order to elicit different levels of play and standardize the setting across different children. Despite these limitations, we are convinced that this could represent a way to experiment new procedures, potentially helpful in the future, to reach those patients who have difficulties getting to the hospital as has already been achieved in other countries (53).

Furthermore, the video recordings will also be helpful to assess parent-child interaction in their natural environment (54, 55). In order to obtain information on the children's development, we chose to investigate their level of play skills. For this purpose, we created a dedicated checklist that could be administered to parents during video-conference interviews.

Finally, we encouraged parents to comment on their experience of the telematic adaptation of the procedure and to share their level of satisfaction and perceived efficacy of the different web-platform appointments, highlighting any critical issues and providing suggestions where possible. It will provide researchers with precious feedback that will facilitate future improvements in remote procedures.

The preliminary feedback we have received since the start of the remote surveillance protocol suggests, in the majority of cases, a positive response to our proposal by the families, who have appreciated the possibility to keep in touch with the research team and to share any developmental concerns about their child. In addition, the telehealth procedure we have implemented allows families to avoid traveling to the FSM (they arrive from all over Italy), saving in this way time, money, time off from work,



and potentially stressful experience for both parents and child (e.g., due to travel meltdowns and sensory overload that could occur in the child).

## FUTURE DIRECTIONS

Active surveillance of infants at risk for ASD should continue during COVID-19 social distancing restrictions in order to start an intensive intervention during early sensitive periods (56) for toddlers identified with atypical development. To this aim, we implemented the current protocol intended to provide telehealth assessment in at-risk populations.

We are fully aware that our telehealth assessment is not exhaustive and that the lack of remote standardized tests for ASD diagnosis could limit the ability to detect early risk signs of the disorder, especially with milder cases, leading us to be cautious in our diagnostic conclusions.

Unquestionable advantages of this procedure include (i) better access, especially for families with transportation and childcare challenges; (ii) the possibility of removing job-related absence as well as cost of the travel; and (iii) the opportunity to observe the child in their naturalistic environment and accordingly to provide more family-centered recommendations.

Conversely, extensive use of telehealth certainly needs the following: (i) appropriate knowledge about data security and data protection rules; (II) the use of user-friendly platforms that can be accessible by all caregivers regardless of their technological abilities or economic status; and (iii) the reduction of regulatory

barriers that interfere with reimbursement for services provided via telehealth.

To overcome these difficulties, we used free platforms that are easily downloadable from any online store and do not require payment; we have also created a video tutorial to make downloads for parents. Through the online video registration, we have also avoided the telematic transmission of data by parents, reducing difficulties and risks deriving from this. Moreover, the informed consent contains a detailed section on data protection according to European regulation (GDPR 2016/679 (Prot. 4/2018 PO) and approved by our institutional Data Protection Officer.

In conclusion, in spite of negative health, social, and economic consequences, the current COVID-19 crisis could represent an opportunity to reorganize child mental health care by introducing innovative approaches through telehealth, thus paving the way for broader access and more efficient use of available public resources (57). Future investigations should accurately compare remote surveillance to face-to-face evaluations (e.g., via randomized, controlled trials) in order to shed light on the efficacy, large-scale feasibility, and cost-effectiveness of online procedures, with the final aim of developing evidence-based guidelines for a virtuous coexistence of virtual and in-person assessment (58).

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Pediatric Ethical Committee of Tuscany region at Meyer Children's Hospital. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## AUTHOR CONTRIBUTIONS

NC, VC, AM, RT, and FA conceived and created the protocol. FM supervised all the phases of the study. EC and SC wrote the paper. NC, VC, RL, AM, MP, FM, RT, and FA critically reviewed the manuscript. All authors contributed to the article and approved the submitted version.

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# Perceived Threat of the Coronavirus and the Role of Trust in Safeguards: A Case Study in Slovakia

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In this exploratory research study, we developed an instrument to investigate people's confidence in safeguarding measures [Confidence in Safeguards Scale (CSS)] and we adapted an instrument measuring perceived risk of coronavirus [perceived risk of coronavirus scale (PRCS)] that was originally based on a perceived risk of HIV measure. We then explored the effect of public confidence in safeguarding measures designed to halt the spread of the coronavirus on perceived risk, controlling for related covariates. The sample consisted of  $N = 565$  respondents; 119 were males (21.1%) and 446 were females (78.9%). Mean age was 35.42 (SD = 13.11), range was 18–77 years. We used convenience sampling to gather the data at the end of March 2020 via social media in Slovakia. The CSS showed good reliability levels and a three-factor structure: Confidence in Institutions, Confidence in Personal and Family Behaviors, and Confidence in Others' Behaviors. The PRCS showed good reliability levels and a two-factor structure: Fear of Contraction and Perceived Likelihood of Contraction. Participants with higher levels of Confidence in Others' Behaviors perceived the spread of the coronavirus to be less threatening, both cognitively (less perceived likelihood of contraction) and affectively (less fear of contraction). This finding could be used when designing public health policy and emergency communication. Enhancing confidence in others' behaviors could encourage individual responsibility, social responsibility, and solidarity through social bonds extending beyond the family. In future research we plan to replicate the data collection using the same instruments in different countries so the results are comparable across cultures and can be used to improve emergency communication.

**Keywords:** coronavirus, confidence, risk, safeguards, public health

## INTRODUCTION

The coronavirus outbreak has triggered an unprecedented crisis. No other contagious epidemic (MERS, Ebola, swine flu) has led to such large safeguarding measures in Slovakia. In situations such as this, it is important to gather information on public perceptions of risk, the preparedness of people and institutions, protective behaviors, and trust and confidence in the safeguards so adequate responses can be taken. The public is exposed to a constant flow of information from news channels

and social media, leading to information overload during the public health emergency. There is no doubt the spread of coronavirus is perceived as a threat and a risk. Public and private institutions have implemented many safeguarding measures to tackle the situation. Public confidence in these safeguarding measures is crucial and should help alleviate the perceived risk. However, careful consideration is required: it is crucial to avoid panic, but the public response should not be light-hearted either. The most desirable outcome is a careful balance of worry and just enough fear to change peoples' behavior without the destructive effects of public panic. Risk communication in a public health emergency (Glik, 2007) should be designed whilst bearing in mind its effect on public trust. Carpenter (2010) demonstrated in a meta-analysis that if people perceive a negative health outcome to be severe and think they are susceptible, they are more inclined to perceive the benefits of behaviors that reduce the likelihood of that outcome. Previous research (Rubin et al., 2009) has shown that controlling for personal elements, namely perceptions, trust and anxiety is important: the "recommended changes were associated with perceptions that disease is severe, that the risk of catching it is high risk, that the outbreak will continue for a long time, that the authorities can be trusted, that good information has been provided, that people can control their risk of catching it, and that specific behaviors are effective in reducing the risk." There is a fair amount of literature on risk communication and public trust (see e.g., Prati et al., 2011). It is known that social factors and social trust are crucial here (Phelan and Link, 1995; Kawachi et al., 1999; Hawe and Shiell, 2000; Subramanian, 2002; Kim et al., 2006). There is also research on risk perception and public trust (Weerd et al., 2011). We also have some incidental evidence on public safeguarding measures and social factors in some countries, including Slovakia (Perugini and Vladislavjevic, 2020), that shows that social and economic background (not just perceptions of the coronavirus threat) have an effect on actors' behaviors—for example, socially and economically vulnerable actors with precarious jobs cannot afford to stop working or limit their work hours, especially in countries like Slovakia where state help and/or innovative work solutions are sluggish and inelastic. Actors who have continued to work may have very different attitudes concerning the perceived threat of the coronavirus.

The new Confidence in Safeguards scale (CSS) contains three dimensions (Confidence in Institutions, Confidence in Personal and Family Behaviors, Confidence in Others' Behaviors), and the literature has already provided a rationale for distinguishing between cognitive versus affective risk appraisal in the adapted Perceived Risk of HIV Scale (PRHIV), see Oh et al. (2015). We therefore formulated three hypotheses on the relation between public trust and perceived threat of coronavirus:

- (1) Confidence in behaviors of self/family will positively predict Fear of Contraction—the rationale is that respondents who adapt strict safeguarding measures are more anxious. On the other hand, respondents have more control over their own behavior and the behavior of their family members, and their fear of contraction could positively enhance their behavior and the family's behavior, in turn increasing levels of confidence in self/family behaviors.
- (2) Confidence in others' behaviors will negatively predict both parts of Perceived Risk of Coronavirus—the rationale is that others' behavior lies outside the respondent's control, but it is also true that if others follow the safeguarding measures that could contribute to reducing the risk of infection.
- (3) Confidence in institutions will negatively predict both parts of Perceived Risk of Coronavirus—the rationale is practically the same as in the previous hypothesis: the institutional response is outside the respondent's control and could have an impact on the spread of the coronavirus.

## AIM OF THE STUDY

The coronavirus pandemic is unprecedented. Therefore we have no hypotheses—this research is exploratory and the goal is to describe (rather than explain) some important patterns in perceptions and reasoning during this crisis. Our research goals were to: (1) develop a reliable instrument to investigate people's confidence in the safeguarding measures (both institutional and behavioral); (2) adapt the instrument to measure perceived risk of coronavirus; and (3) to investigate the effect of public confidence in safeguarding measures designed to halt the spread of the coronavirus on perceived risk, controlling for related covariates.

## METHODS

### Setting: Publicly Available Data on the Spread of COVID-19 in Slovakia in March 2020

First of all we present the situation in Slovakia in March 2020, providing information on the spread of the coronavirus, including the rate of testing. For the sake of comparison, data from neighboring countries (Czechia, Poland, Hungary, Austria) is presented as well. Secondly, we list the safeguarding measures implemented by the Slovak authorities during this period (March 2020).

In Slovakia the first positive case of COVID-19 was officially announced on 6 March 2020 (The National Health Information Centre, Extended Statistics, 2020). The daily increase in the numbers testing positive remained very low (under 5) until 11 March. **Figure 1** presents the daily increase in confirmed cases in Slovakia in March 2020 (based on data from The National Health Information Centre, Extended Statistics, 2020). We can see that the cumulative growth curve is linear and does not show exponential growth: the daily increase in numbers is still relatively low (under 50). The total number of confirmed cases in Slovakia had reached 400 by 31 March.

We must also take into account the number of tests performed: the number of tests is relatively low, but Slovakia is capable of conducting the same number of tests on average as its neighbors (recalculated using a log scale per million inhabitants see Roser et al., 2020).

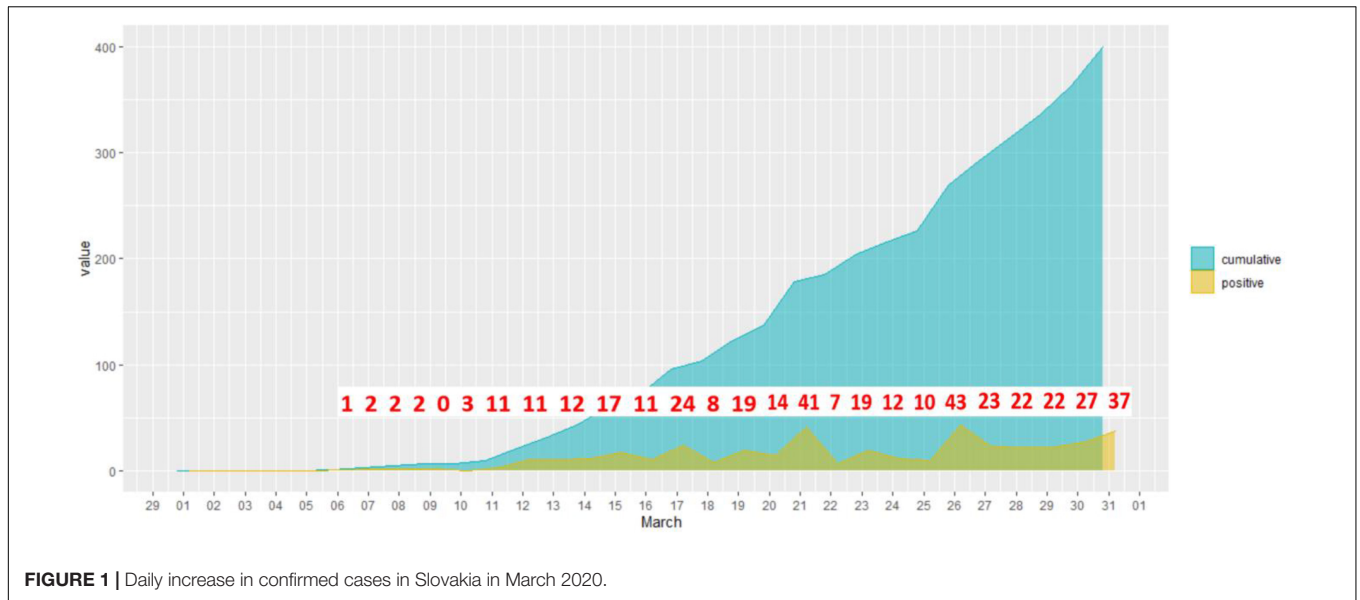


FIGURE 1 | Daily increase in confirmed cases in Slovakia in March 2020.

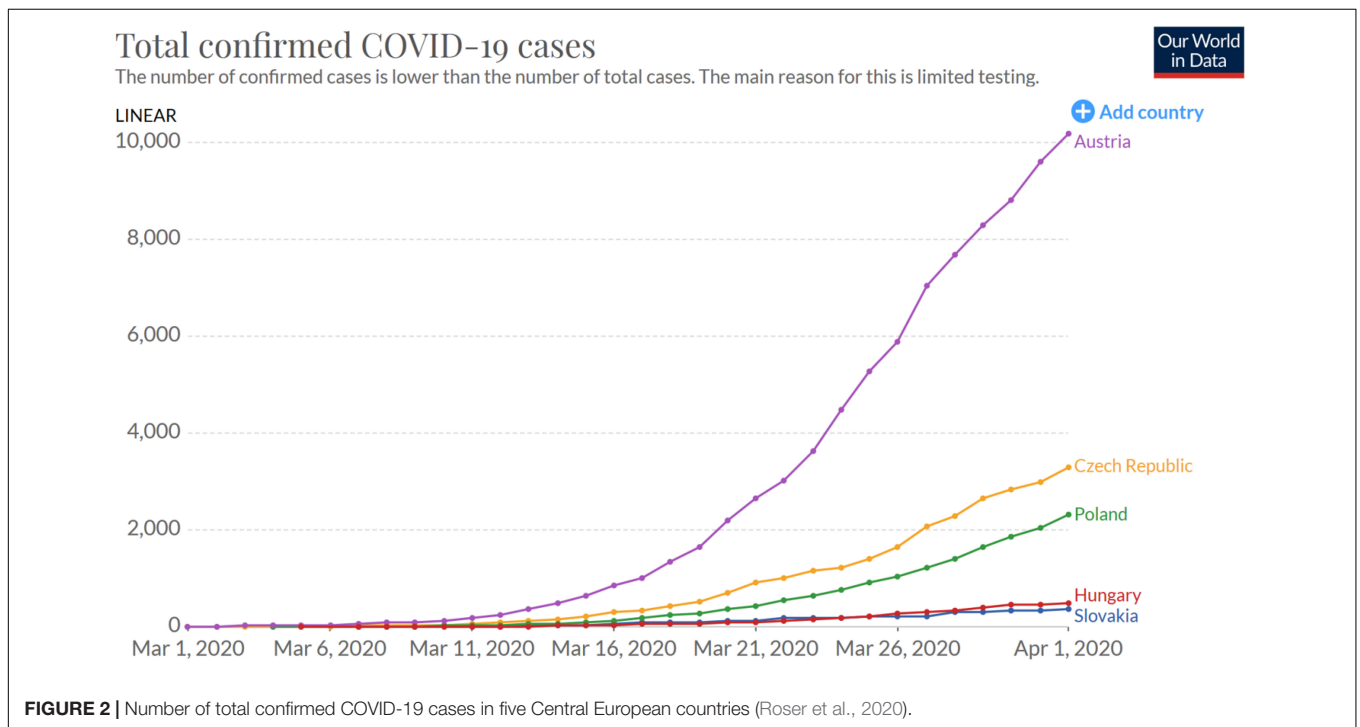


FIGURE 2 | Number of total confirmed COVID-19 cases in five Central European countries (Roser et al., 2020).

If we compare the number of confirmed cases in Slovakia in March to those in neighboring countries, the time series for Slovakia has an almost identical shape to that for Hungary, and similar to that for the Czechia and Poland. The time series for these countries differ markedly from Austria's.

We can now turn our attention to the safeguarding measures adopted in Slovakia by the state authorities. On 9 March all schools and universities were closed, and on 10 March public events were banned. On 13 March all international passenger transport to and from Slovakia was canceled. On 16 March a state of emergency was declared, and all private businesses (except

food shops, health and beauty retailers, pharmacies, and petrol stations) and state offices were closed. On 25 March the wearing of a mask covering the nose and mouth became compulsory in public. On the same day the Slovak parliament passed a “corona law” which permits (among other things) the government to use mobile location data to monitor user location.

We conclude this section by pointing out that Slovakia has a low number of confirmed COVID-19 cases and strict safeguarding measures in place, but this is not exceptional in Central Europe. We would like to stress that this conclusion has nothing to do with the epidemiological situation: we are simply

reviewing the public and published resources that are widely available in Slovakia—our research design focuses on public trust and the perceived threat of coronavirus. The epidemiological situation (i.e., the population ratio of infected people) is unknown and may differ substantively from the number of confirmed cases.

## The Research Sample

The sample consisted of  $N = 565$  respondents; 119 were males (21.1%) and 446 were females (78.9%). Mean age was 35.42 (SD = 13.11), range was 18–77 years. All the participants were Slovak citizens. Data were gathered via social networks between March 27, 2020 and March 31, 2020. We used convenience sampling. Data were collected in accordance with the ethical standards of the institutional and/or national research committee and in accordance with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

## Measures

### Perceived Risk of Coronavirus Scale (PRCS)

The PRHIV (Napper et al., 2012) has been adapted. The adaptation is similar to the adaptation for Ebola—the Perceived Vulnerability to Ebola risk scale (PVE; Kim et al., 2016). The scale originally contained 10 items but in the original study the authors excluded two of the items from the scale (Napper et al., 2012). The remaining items were then reformulated using a unified answer format which is more understandable and makes it easier and quicker for participants to complete. We also changed the name of the contagious disease from HIV to coronavirus. For the list of PRC items see **Appendixes 1–3, Supplementary Materials**. The psychometric analysis of the original scale was reproduced in this study, and modified slightly (see “Results” and **Supplementary Materials, Appendixes 1–3**), since the literature has already provided a rationale for distinguishing between cognitive versus affective risk appraisal, see Oh et al., 2015).

### Confidence in Safeguards Scale (CSS)

The CSS contains ten items and was created for this research (see Appendix 2). It contains three dimensions: (1) Confidence in Institutions, (2) Confidence in Personal and Family Behaviors, and (3) Confidence in Others’ Behaviors. We decided to include these three dimensions so three aspects could be distinguished—confidence in personal behavior and family members’ behavior, which is at least partially within the respondent’s control; confidence in others’ behavior, which lies outside the respondent’s control; and confidence in institutional behavior, which also lies outside the respondent’s control but is represented differently. We deliberately avoided mentioning specific safeguarding behaviors (e.g., wearing masks, washing hands, social distancing, and staying at home): respondents could have very different opinions as to which behaviors they consider safe, and the aim was not to measure the prevalence of specific behaviors, but rather the overall confidence of respondents in any safeguarding behaviors: for example, item 4 (“My family members behave with adequate caution in regard to the spread of the coronavirus”) makes no reference to specific behaviors: it measures the respondent’s perception, not the occurrence of specific behaviors. We realize that respondents may have inconsistent opinions

on safe behaviors in both directions (they might be confident the behaviors are safe for no objective reason, or they might consider even very precautionary behaviors as being insufficiently safe). Consequently this instrument is designed to measure confidence only. A psychometric analysis of this new scale was conducted as part of this study (see “Results” and **Supplementary Materials, Appendixes 1–3**).

### Sociodemographic Data–Covariates

We have included the standard set of demographic variables (gender, age, education, size of residential site, number of household members, number of children aged under 18 in the household). Some of these could have a direct effect on perceived threat (women generally display more anxiety than men, see Remes et al., 2016; old people and people living in small villages or towns could be more vulnerable, see Garnier–Crussard et al., 2020; Ranscombe, 2020; Zhang and Schwartz, 2020). Over and above this standard set, two other specific covariates were included: (1) taking any prescribed medication (this factor could influence respondents’ perceptions and behavior), and (2) work attendance (respondents who go out to work could perceive the threat of coronavirus differently). Controlling for these covariates is important because otherwise some or all the structural regression coefficients could produce spurious results—false negatives or false positives (or both).

## DATA ANALYSIS

### Procedure

As far as the data are concerned, after presenting the descriptive statistics, we first investigate the psychometric properties of both scales. We replicate the item-response theory (IRT) approach used in the original PRHIV (Napper et al., 2012) and check its factor structure (the literature has already provided a rationale for distinguishing between cognitive versus affective risk appraisal, see Oh et al., 2015) and reliability. Non-parametric IRT kernel smoothing (Ramsay, 1991, 1997) is used to check the monotonicity of the expected item scores (EIS). We then propose some essential amendments based on the IRT re-analyses of our data. For all the IRT analyses, we use statistical program R, version 3.6.1 (R Core Team, 2019), packages “mirt” (Chalmers, 2012) for the IRT factor models and residuals analyses, and package “KernSmoothIRT” (Mazza et al., 2014) for the IRT kernel smoothing analysis. See **Supplementary Materials, Appendixes 1–3** for all R codes.

The next step is the ESEM (exploratory structural equation modeling, see Asparouhov and Muthén, 2009; Marsh et al., 2011) factor analysis of the new CSS. The ESEM approach combines the confirmatory factor analytical approach (factor structure is specified in advance in target rotation) with the exploratory approach (in target rotation, some small cross-loadings on different factors are allowed, which is more realistic with regards to the data than setting them to zero). This approach is appropriate in our case because we have theoretically justified the factor structure of this instrument (confirmatory approach), but not yet tested it on the data (exploratory approach). Finally



we fit the structural model where the CSS latent factors are predictors of the Perceived Risk of the Coronavirus Scale latent factors, controlling for the covariates: gender, age, education, size of residential site, number of household members, number of children under 18 in household, taking any prescribed medication, and work attendance. See **Figure 1** for this structural model. We then check the fit of this model with the data (Comparative Fit Index CFI and Tucker-Lewis Index TLI should be >0.95 for excellent fit and >0.90 for acceptable fit, and RMSEA index should be <0.050 for excellent fit and <0.080 for acceptable fit, see Hu and Bentler, 1999; Kline, 2005). All ESEM models are fitted in the Mplus program, version 7.4 (Muthén and Muthén, 1998-2017). See Mplus codes in **Supplementary Materials, Appendix 1–3**.

## RESULTS

### Descriptive Statistics

Descriptive statistics for both scales (and covariates) are presented in **Table 1**.

### Psychometric Analysis of the Perceived Risk of Coronavirus Scale (PRCS)

The final version of the original PRHIV (Napper et al., 2012) contains eight items. However, based on their original analyses of the ten items, the authors subsequently dropped two items with suboptimal psychometric properties. The authors checked the unidimensionality and local independence of this instrument and claimed it sufficiently unidimensional based on the RMSEA and GFI fit indices for the one-factor confirmatory factor analysis model (Napper et al., 2012). However, there are serious doubts about this claim: (1) the GFI index is very sensitive to sample size, and its use is discouraged in the relevant psychometric literature (Shevlin and Miles, 1998; Fan and Sivo, 2007); (2) the authors report that the value of RMSEA for the one-factor model is 0.087 and declare that supports use of this model, but this declaration directly contradicts the psychometric recommendations (RMSEA under 0.05 for excellent fit, under 0.08 for acceptable fit, see Bentler, 1990; Hu and Bentler, 1999; Kline, 2005; Chen et al., 2008). Moreover, the 90% confidence interval of the reported RMSEA of 0.087 is 0.078–0.095 (our own calculation based on  $\chi^2(35) = 242$  and  $N = 785$  reported by the authors) which is barely acceptable and so cannot be an indication of good fit.

Following the original procedure in Napper et al. (2012), the PRCS items were modeled using Samejima’s two-parameter polytomous graded response model (GRM) with marginal maximum likelihood estimation, using “mirt” package (Chalmers, 2012) in statistical program R, version 3. 6. 1. (R Core Team, 2019). We do not report the GFI; instead we report the RMSEA (with 90% CI) and SRMSR as recommended in the psychometric literature on goodness of fit for IRT models (Maydeau-Olivares, 2013). The one-factor model had an unacceptable RMSEA (0.116, 90% CI 0.101–0.132) and SRMSR (0.121). An inspection of the residuals (based on G2\* statistics with better properties than a mere inspection of the

residual correlations, see Chen and Thissen, 1997; Houts and Edwards, 2013) showed a distinctive pattern in the signed values of the Cramer phi indices, indicating a second factor (see **Supplementary Materials, Table 1**). Moreover our inspection of the EIS by means of non-parametric IRT kernel smoothing (Ramsay, 1991, 1997; Mazza et al., 2014) clearly indicated that item 4 was a problem (and that item 8, while less problematic, was suboptimal, see **Supplementary Materials, Figure 1**).

Since the literature has already provided a rationale for distinguishing between cognitive versus affective risk appraisal, see Oh et al. (2015), we tried to fit a two-factor EFA model, and

**TABLE 1** | Descriptive statistics of the PRC & CSS scales and covariates.

Perceived Risk of Coronavirus Scale (PRCS)							
Item	Mean	SD	1	2	3	4	5
cor01	2.45	1.02	0.20	0.31	0.34	0.12	0.03
cor02	3.38	1.21	0.08	0.18	0.24	0.29	0.21
cor03	2.96	1.31	0.15	0.25	0.23	0.21	0.16
cor04	2.99	1.35	0.15	0.27	0.21	0.18	0.19
cor05	3.83	1.21	0.06	0.09	0.23	0.22	0.40
cor06	2.97	1.25	0.13	0.25	0.26	0.22	0.14
cor07	2.46	1.10	0.20	0.37	0.26	0.11	0.06
cor08	2.37	1.21	0.29	0.30	0.21	0.13	0.07
Confidence in Safeguards Scale (CSS)							
Item	Mean	SD	1	2	3	4	5
pre01	4.26	0.85	0.01	0.03	0.11	0.38	0.46
pre02	4.53	0.64	0.01	0.01	0.04	0.34	0.60
pre03	3.95	0.92	0.02	0.06	0.15	0.50	0.27
pre04	4.39	0.77	0.01	0.02	0.08	0.37	0.52
pre05	2.32	0.97	0.22	0.36	0.32	0.08	0.02
pre06	3.63	0.97	0.03	0.09	0.26	0.45	0.17
pre07	2.81	1.07	0.12	0.27	0.35	0.20	0.06
pre08	3.89	0.94	0.02	0.03	0.27	0.38	0.30
pre09	2.67	1.02	0.14	0.26	0.44	0.11	0.05
pre10	3.31	0.95	0.04	0.15	0.35	0.39	0.07
Covariates							
	0	1	2	3	4	5	6
Gender	0.21	0.79	–	–	–	–	–
Education	0.01	0.30	0.69	–	–	–	–
Site	0.05	0.25	0.14	0.16	0.08	0.32	–
Medications	0.61	0.39	–	–	–	–	–
Work	0.90	0.10	–	–	–	–	–
Household	0.07	0.28	0.24	0.25	0.12	0.04	–
Children	0.63	0.22	0.12	0.03	–	–	–

*PRC & CSS scales: SD = standard deviation. Percentages of responses: 1 = strongly disagree, 2 = disagree, 3 = I don't know, 4 = agree, 5 = strongly agree. Covariates percentages of responses: gender0 = males, gender1 = females. education0 = elementary, education1 = secondary school, education3 = university. site0 = under 500, site1 = 501-5000, site2 = 5001-20000, site3 = 20001-50000, site4 = 50001-100000, site5 = over 100000. medications0 = no, medications1 = yes. work0 = no, work1 = yes, household0 = single, household1 = 2, household2 = 3, household3 = 4, household4 = 5, household5 = 6 or more. children0 = 0, children1 = 1, children2 = 2, children3 = 3 or more.*



the fit improved substantially (RMSEA = 0.048, 90% CI 0.021–0.078; SRMSR = 0.046). The subsequent inspection of the EIS based on two dimensions showed that the problems with items 4 and 8 had disappeared, see **Supplementary Materials, Figure 2**). The factor loadings of this two-factor model are presented in **Table 2**. Looking at the item content we can see that the items expressing affective content (e.g., worrying, feeling vulnerable) load on the first factor, and items expressing cognitive content (likelihood, chance, thinking) load on the second factor. The correlation between the latent factors is 0.362.

Empirical IRT reliability, based on the weighted likelihood estimates of latent abilities, was 0.83 for the Fear dimension and 0.83 for the Likelihood dimension. Cronbach alpha was 0.75 for the total scale (eight items), 0.72 for the Fear dimension (four items), and 0.71 for the Likelihood dimension (four items). Therefore, we consider the PRCS to be a two-dimensional construct consisting of the Fear of Contraction subscale containing four items, and the Perceived Likelihood of Contraction subscale containing four items. Moreover, the literature has already provided a rationale for distinguishing between cognitive versus affective risk appraisal, which fits nicely with these results (see Oh et al., 2015).

### Psychometric Analysis of the Confidence in Safeguards Scale (CSS)

The CSS was created as a ten-item three-dimensional instrument, containing these three dimensions: Confidence in Institutions, Confidence in Personal and Family Behaviors, and Confidence in Others' Behaviors. The ESEM model was fitted using the WLSMV estimator (weighted least squares mean and variance adjusted method, which performs well with ordinal items, see Beauducel and Herzberg, 2006; Bandalos, 2014) and target rotation specifying the theoretically justified loadings, but

allowing some small cross-loadings at the same time. See **Figure 3**, the CSS model.

The three-factor ESEM model has a good fit with the data:  $\chi^2(18) = 70.88$ , CFI = 0.97, TLI = 0.93, RMSEA = 0.072 (90% CI 0.063–0.080). Factor loadings are shown in **Table 3**.

We can see that both the fit indices and factor loadings support the three-dimensional model of the CSS scale: items expressing confidence in personal and family behaviors predominantly load on the first factor, items assigned to others' behaviors load mostly on the second factor, and items expressing confidence in institutions load mostly on the third factor. The correlations among latent factors are 0.440 (confidence in personal/family behaviors with confidence in others' behaviors), 0.262 (confidence in personal/family behaviors with confidence in institutions), and 0.554 (confidence in others' behaviors with confidence in institutions). All are statistically significant at 0.001. Cronbach alpha for the total scale was 0.75, and for the subscales 0.70 (Confidence in Personal and Family Behaviors), 0.73 (Confidence in Others' Behaviors), and 0.72 (Confidence in Institutions).

### The Final ESEM Structural Model

The final ESEM structural model is presented in **Figure 3** (error variances, disturbances, and covariances are omitted). This model has a good fit with the data:  $\chi^2(239) = 508.88$ , CFI = 0.94, TLI = 0.93, RMSEA = 0.045 (90% CI 0.039–0.050). Regression weights are presented in **Table 4**.

## DISCUSSION

In this exploratory research study we developed an instrument to investigate people's confidence in safeguarding measures (CSS), adapted the instrument measuring the perceived risk of coronavirus (PRCS), and explored the effect of public confidence in safeguarding measures designed to prevent the spread of the coronavirus on perceived risk, controlling for related covariates (gender, age, education, size of site, number of household members, number of children under 18 in household, taking any prescribed medication, and work attendance).

The three-factor ESEM model for the CSS had a good fit with the data, confirming a three-dimensional structure: Confidence in Institutions, Confidence in Personal/Family Behaviors, and Confidence in Others' Behaviors. In addition the correlations among the three latent factors were statistically significant. The Cronbach alpha for the scale was adequate at 0.75. The CSS showed good psychometric properties and the expected factor structure and consequently the CSS can be used to reliably measure confidence in safeguards to prevent the spread of Coronavirus at three levels: personal and family, other people, and institutions. Admittedly, the three items of the "Self/Family" factor are mixed—two of them are formulated such that they express the person's own behavior, and one item is formulated such that it expresses the behavior of family members. This is probably the reason this "family" item has a moderate cross-loading on the "Others" factor. Item 1 ("I have enough information.") is passive, and could be amended to "I try to get

**TABLE 2 |** Factor loadings of two-factor model of the PRCS scale, IRT EFA analysis.

Item	Factor 1 (Fear)	Factor 2 (Likelihood)
1. I have a gut feeling I am likely to get infected with coronavirus.	0.090	<b>0.799</b>
2. There is a chance, no matter how small, I could get coronavirus.	0.025	<b>0.499</b>
3. I worry about getting infected with coronavirus.	<b>0.782</b>	0.195
4. I find it hard to picture myself getting coronavirus.	<b>0.667</b>	−0.195
5. I am sure I will <u>NOT</u> get infected with coronavirus.*	0.074	<b>0.606</b>
6. I feel vulnerable to coronavirus infection.	<b>0.668</b>	0.230
7. I think my chances of getting infected with coronavirus are large.	0.199	<b>0.703</b>
8. I have often thought about getting coronavirus.	<b>0.665</b>	0.170

Factor loadings higher than 0.300 are presented in bold. \*Item 5 was reverse scored.

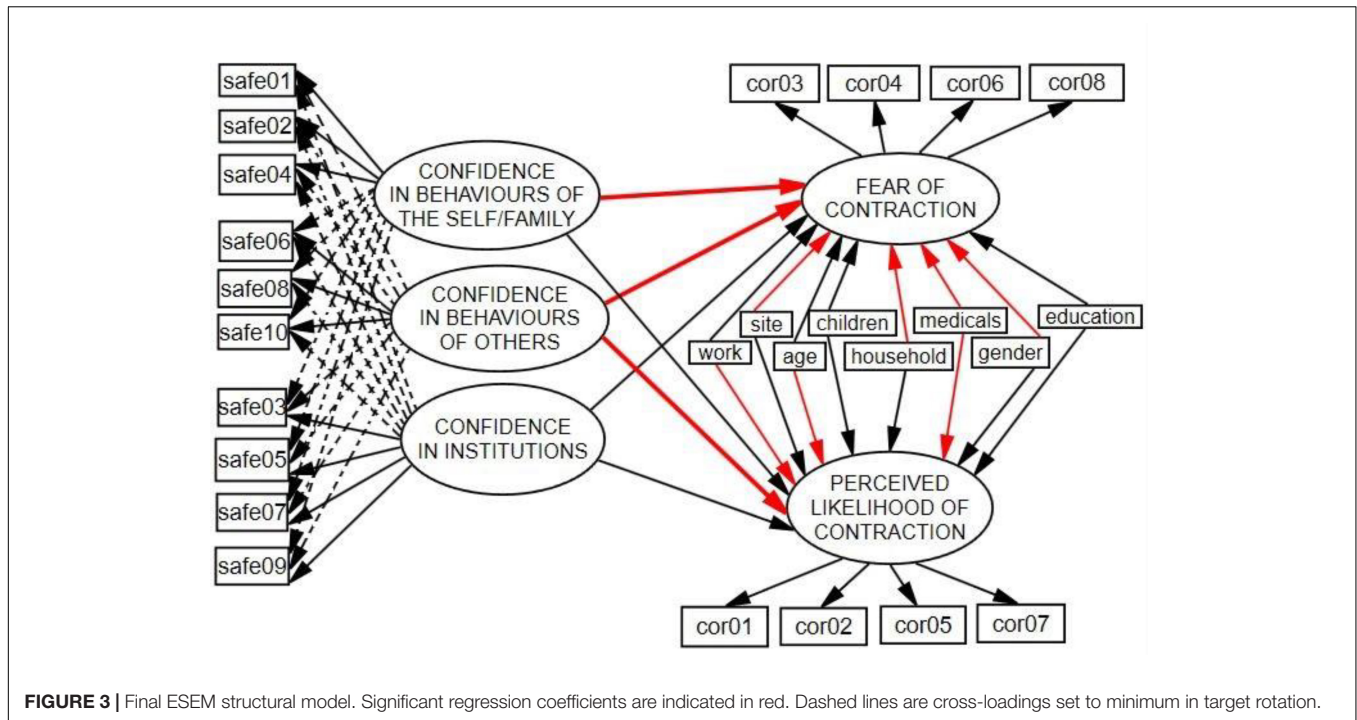


FIGURE 3 | Final ESEM structural model. Significant regression coefficients are indicated in red. Dashed lines are cross-loadings set to minimum in target rotation.

TABLE 3 | Factor loadings of three-factor ESEM model of the CSS scale, target rotation.

Item	Factor 1 (Self/Family)	Factor 2 (Others)	Factor 3 (Institutions)
1. I have enough information about the spread of the coronavirus.	<b>0.409</b>	0.048	0.145
2. I behave with adequate caution in regard to the spread of the coronavirus.	<b>0.993</b>	-0.162	-0.031
3. The authorities are taking adequate safeguards against the spread of the coronavirus.	0.103	0.194	<b>0.382</b>
4. My family members behave with adequate caution in regard to the spread of the coronavirus.	<b>0.464</b>	0.322	-0.021
5. Medical facilities are prepared for the spread of the coronavirus.	0.046	-0.098	<b>0.682</b>
6. My neighbors and the people I meet behave with adequate caution in regard to the spread of the coronavirus.	0.007	<b>0.769</b>	0.019
7. Shops, pharmacies, and drugstores are prepared for the spread of the coronavirus.	-0.051	-0.034	<b>0.775</b>
8. My fellow workers behave with adequate caution in regard to the spread of the coronavirus.	0.128	<b>0.583</b>	-0.016
9. Banks and financial services are prepared for the spread of the coronavirus.	-0.011	0.095	<b>0.539</b>
10. Overall, people in my country behave with adequate caution in regard to the spread of the coronavirus.	-0.029	<b>0.454</b>	0.209

Factor loadings specified in target rotation are presented in bold.

up-to-date information about the spread of the coronavirus.” In the same vein, Item 4 could be amended to “As a family, we all behave with adequate caution.” This formulation refers to both the person’s own behavior and the behavior of family members. We recognize that including the family item along with items referring to the person’s own behavior introduces an element of confounding here, but we assume that many respondents will have a tightly knit family life (reinforced during the pandemic, for good or for worse), and having only individualistic and institutional items (i.e., omitting the family item) would be too restrictive. On the one hand, one can far more easily avoid interactions with non-family others than interactions with family members, and on the other hand, people have more influence on the behavior of family members than on the behavior of non-family others. At the height of the pandemic, families were often the centre of social life, and arguably “family members”

and non-family others are not equivalents. Therefore merging the self and family precautions is to an important extent necessary: removing the family item from the “self” factor and including it in the “others” factor would probably distort the situation. In future research it would probably be worth considering a four-dimensional construct: Self, Family, Others, and Institutions—but adding the family item to the others factor would probably be too restrictive.

The PRCS was adapted from the PRHIV (Napper et al., 2012). Although Napper et al. (2012) claim the scale is unidimensional, their reported results (RMSEA value and confidence interval) do not support this. Similarly, our PRCS results show that the scale has two factors, not one. The two factors represent Fear of Contraction (e.g., worrying, feeling vulnerable, picturing self, and recurrent thoughts) and Perceived Likelihood of Contraction (e.g., likelihood, chance, thinking, and gut feeling) which

**TABLE 4** | Regression weights from the final ESEM structural model.

Regression path	$\beta$ (SE)	<i>p</i> -value	SD value
FEAR OF CONTRACTION ~ confidence in self/family	<b>0.138 (0.06)</b>	0.013	0.153
FEAR OF CONTRACTION ~ confidence in others	<b>-0.270 (0.07)</b>	< 0.001	-0.299
FEAR OF CONTRACTION ~ confidence in institutions	-0.058 (0.06)	0.330	-0.064
LIKELIHOOD OF CONTRACTION ~ confidence in self/family	0.028 (0.05)	0.558	0.035
LIKELIHOOD OF CONTRACTION ~ confidence in others	<b>-0.159 (0.05)</b>	0.003	-0.201
LIKELIHOOD OF CONTRACTION ~ confidence in institutions	-0.052 (0.05)	0.289	-0.065
FEAR OF CONTRACTION ~ age	0.001 (0.01)	0.808	0.012
FEAR OF CONTRACTION ~ gender	<b>0.288 (0.10)</b>	0.004	0.319
FEAR OF CONTRACTION ~ work	-0.030 (0.14)	0.833	-0.033
FEAR OF CONTRACTION ~ medications	<b>0.439 (0.09)</b>	< 0.001	0.486
FEAR OF CONTRACTION ~ education	-0.168 (0.09)	0.072	-0.086
FEAR OF CONTRACTION ~ site	<b>-0.052 (0.02)</b>	0.032	-0.099
FEAR OF CONTRACTION ~ household	<b>-0.111 (0.04)</b>	0.008	-0.155
FEAR OF CONTRACTION ~ children	0.114 (0.06)	0.059	0.104
LIKELIHOOD OF CONTRACTION ~ age	<b>-0.007 (0.01)</b>	0.032	-0.115
LIKELIHOOD OF CONTRACTION ~ gender	-0.067 (0.09)	0.449	-0.084
LIKELIHOOD OF CONTRACTION ~ work	<b>0.310 (0.13)</b>	0.017	0.392
LIKELIHOOD OF CONTRACTION ~ medications	<b>0.181 (0.08)</b>	0.022	0.228
LIKELIHOOD OF CONTRACTION ~ education	0.116 (0.09)	0.190	0.068
LIKELIHOOD OF CONTRACTION ~ site	0.032 (0.02)	0.157	0.070
LIKELIHOOD OF CONTRACTION ~ household	-0.075 (0.04)	0.057	-0.119
LIKELIHOOD OF CONTRACTION ~ children	0.071 (0.06)	0.226	0.073

*Bold = Statistically significant coefficients are presented in bold. SD value = standardized value.*

correlated together at the level of 0.362. Concerning reliability, the scale showed good reliability coefficients (Cronbach alpha was 0.75 for the total scale, for Fear of Contraction it was 0.72, and for Perceived Likelihood of Contraction it was 0.71. This two-dimensional structure makes sense in interpretational terms: we can easily assume different patterns of responses—one respondent could perceive a high risk cognitively, but still express either high affective concern or low affective concern; while another respondent could perceive a low risk cognitively, but still feel either high affective concern, or low affective concern. Without considering these two different patterns, we could obtain distorted results.

Now we will discuss the hypotheses we formulated in the introduction:

- (1) Confidence in behaviors of self/family will positively predict Fear of Contraction: this hypothesis has been confirmed. Confidence in personal and family behaviors predicts fear of contraction and is statistically significant and positive, but it does not predict the perceived likelihood of contraction. Respondents who are more confident about their own and their family's precautionary behaviors are more scared of becoming infected: they affectively perceive the coronavirus to be a threat, but not cognitively. It could be that some form of circular causality is at work here: their fear of contracting the coronavirus could in turn boost their precautionary behaviors, but not enough to alleviate their cognitive perception of this threat. It is likely that worrying about contagion motivates more precautionary behaviors.

From a clinical psychology perspective it makes perfect sense that this does not alleviate worries about contagion because the precautions act as “safety behaviors.” These offer short-term relief from worry but in the long run confirm and thereby maintain the worry beliefs. This is inflated even more if confidence in others' behaviors is low, as we cannot control others' behaviors to the extent we can control our own behavior. This is in line with models of generalized anxiety disorder (Lissek et al., 2014; Stein and Sareen, 2015), because it shows so clearly why the processes underlying generalized anxiety disorder can be adaptive depending on the context. These results suggest that this mechanism is probably one that policy should exploit.

- (2) Confidence in others' behaviors will negatively predict both parts of Perceived Risk of Coronavirus: this hypothesis has been confirmed as well because confidence in others' behaviors predicts both fear of contraction and perceived likelihood of contraction and is statistically significant and negative: the more confidence people have in the precautionary behaviors of others, the less of a threat they consider the spread of the coronavirus, both affectively and cognitively. People who worry about becoming infected will escalate their safeguarding behaviors. At the same time, people who think others are not doing the same as them will become even more worried. A side effect of this is that people will also perceive that the likelihood of contraction is higher if others are not following the safeguards (after all, “all the others” constitutes a much bigger proportion of the population endangering them than just “me and my

family”). We should also clarify that the PCRS “cognitive” factor (perceived likelihood of contraction) assesses the perceived likelihood of contracting the coronavirus, and not necessarily cognitive appraisals of the fear of the negative consequences of becoming infected (this comes under the “affective” factor, fear of contraction). People in Slovakia who have confidence in others’ safeguarding behaviors (but not in their own and their family’s safeguarding behaviors) consider the coronavirus to be less of a threat. Respondents probably also take into account the fact that social factors are predominantly behind the spread of the coronavirus. This trust in social solidarity is very promising and should be reinforced as much as possible, providing it is strongly connected to the actual mechanisms of coronavirus infection—the best protection is to monitor and avoid people who ignore safeguarding measures. The fact that confidence in others’ behavior is more predictive than confidence in self/family behavior seems to be related to the way the contagion spreads and the anti-contagion measures.

- (3) Confidence in institutions will negatively predict both parts of Perceived Risk of Coronavirus—this hypothesis has not been confirmed. In general the Slovak respondents display low confidence in institutions and their preparedness for the coronavirus pandemic (see **Table 1**), and there is no statistically significant relationship between confidence in institutions and perceived threat of the coronavirus.

As far as the covariates are concerned, there is no statistically significant relationship between education level and number of children in the household and Fear of Contraction or Perceived Likelihood of Contraction. Taking medication significantly and positively predicts both fear of contraction and perceived likelihood of contraction: people taking medication think the spread of coronavirus is more of a threat, which comes as no surprise. Respondents who go out to work (versus those staying at home) show a significant and positive relationship with the perceived likelihood of contraction (cognitive awareness of being at a higher risk), but they do not show a significant relation to fear of contraction. Women (compared with men) display significantly more anxiety (there is a statistically significant and positive relation with fear of contraction), but there is no significant gender difference in relation to the perceived likelihood of contraction, which is again in accordance with previous research (Remes et al., 2016). Respondents living in small sites display more fear of contraction, but less perceived likelihood of contraction (or, to put it the other way around, respondents living in larger sites perceive the coronavirus as less threatening). This finding might seem to run counter to the facts because almost all the main confirmed outbreaks of coronavirus infection in Slovakia and in other countries are located in large cities, but incidental evidence shows that rural areas may be uniquely vulnerable due to the older age structure of many rural communities, the higher prevalence of chronic illnesses, and relative lack of health care facilities and services (Ranscombe, 2020; Zhang and Schwartz, 2020). The same strange pattern of reasoning is valid for age: older respondents think (cognitively

that they are less likely to be infected even though statistically older people are at a higher risk of becoming seriously ill with the coronavirus (Garnier—Crussard et al., 2020). And finally, the more members a household has, the less the coronavirus is affectively perceived to be a threat. This is probably the dual effect of consolation from family members on the one hand, and the psychological effect of loneliness on the other.

## Limitations of the Study

The first limitation consists in the fact that the sample is not representative for the Slovak population: educated respondents, women, and inhabitants of larger sites are overrepresented. Therefore, our results cannot be generalized to the Slovak population.

The second limitation is that we had neither the opportunity nor the time to adopt the proper procedures for validating and piloting our measures: according to psychometric standards, we should have collected the first set of data, then conduct detailed psychometric analyses, and only after inspecting the psychometric properties of our instruments and making the necessary adjustments, should we have begun the second wave of data collection. However, it would be extremely difficult to follow this procedure in the ongoing coronavirus crisis: it would require weeks and the situation is changing so rapidly that the prospective piloting sample could end up measuring very different perceptions from the reference sample collected after several weeks. We therefore decided to collect the data at the end of March 2020 with the aim of obtaining explorative insights instead of developing a more accurate instrument.

There is one more limitation: we cannot offer an adequate explanation for our outcomes—we lack background information about the respondents’ psychological characteristics, social background and networks, biographical histories, and so on. We are therefore unable to explain the significant variability and patterns observed in their responses. Further research is required to achieve this. This could be done using comparative research to replicate the data collection using the same instruments in different countries as soon as possible and comparing the results.

## CONCLUSION

Social trust (Subramanian, 2002; Kim et al., 2006) and other social conditions (Phelan and Link, 1995; Kawachi et al., 1999; Hawe and Shiell, 2000) are very important factors that strongly affect behaviors during any public health emergency, and the current coronavirus pandemic crisis is no exception. Our research indicates that Slovak respondents with higher levels of confidence in others’ behaviors perceived the spread of the coronavirus to be less threatening, both cognitively (perceived likelihood of contraction) and affectively (fear of contraction). Confidence in institutions and confidence in personal and family behaviors had no such effect. This finding should be considered when formulating public health policy and emergency communication to boost and enhance this effect—confidence in others’ behaviors could promote responsible attitudes: if others stick to the safeguarding measures, actors will consider their



own behavior to be meaningful, in accordance with the social situation and their social reputation. However, confidence in others' behaviors might reduce risk perception, and when trust in others' behaviors is too high, actors may reconsider adhering to the safeguarding measures. The impact of social pressure and social reputation implied by the conformist adherence to the safeguarding measures will probably prevail: for example, recent results from Japan (Nakayachi et al., 2020) show that people conformed to social norms by wearing masks and at the same time felt relief from anxiety when wearing masks. Our findings (and other evidence) suggest that decision makers responsible for public health should consider social motivations when implementing public strategies to combat the COVID-19 pandemic.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethical Committee of Faculty of Social and

Economic Sciences of Comenius University in Bratislava in Slovakia. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

Both authors designed the research, collected the data, wrote the manuscript, interpreted the results, revised the manuscript, and read and approved the final manuscript. MK performed the statistical analysis.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.554160/full#supplementary-material>

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# Fighting Coronavirus One Personality at a Time: Need for Structure, Trait Victimhood, and Adherence to COVID-19 Health Guidelines

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Following the outbreak of the COVID-19 pandemic, authorities have issued several guidelines to curb the pandemic's disastrous effects. However, measures' effectiveness is dependent upon people's adherence to them. Therefore, it is crucial to understand the potential factors that explain guideline adherence. In the present brief research report, we investigated need for structure and trait victimhood, i.e., the tendency to feel like a victim, and their effect on fear of the pandemic, which in turn, predicted guideline adherence. Furthermore, the association between fear and guideline adherence was shaped by participants' global self-efficacy: higher levels of self-efficacy predicted more guideline adherence regardless of fear levels. The present findings may be relevant to health messaging endeavors aiming to improve compliance with guidelines.

**Keywords:** coronavirus, COVID-19, mental rigidity, need for closure, need for structure, victimhood, self-efficacy, adherence

## INTRODUCTION

In late 2019, the first cases of COVID-19 were reported in Wuhan, China (Guan et al., 2020). In just a few months this virus had spread across the globe, infected millions, killed hundreds of thousands and caused trillions of dollars in damages to the world economy (Ayittey et al., 2020). Consequently, the World Health Organization (WHO) declared COVID-19 a pandemic and announced a global emergency (Sohrabi et al., 2020). Health authorities and governments globally have responded by issuing numerous guidelines (Lau et al., 2020), the most common of which were: isolation, quarantine, and social distancing (Wilder-Smith and Freedman, 2020). Guidelines for personal measures included sterilizing surfaces, wearing masks, washing hands, etc. (Zhou et al., 2020).

The success of such efforts relies on adherence to these measures. Since some people who are able to adhere to the guidelines, do so, while others do not, adherence is possibly affected by various personal factors. For example, Zhong et al. (2020) have recently demonstrated that adherence to preventive measures depended on people's differential knowledge and attitudes toward COVID-19. Other possible explanations might include solution aversion (Campbell and Kay, 2014), resistance to scientific information (Hornsey and Fielding, 2017), and—as shown regarding COVID-19—even political orientation (Pennycook et al., 2020).

One critical category of personal factors that has been repeatedly shown to affect health-related behaviors and specifically adherence to health guidelines is personality (e.g., Christensen and Smith, 1995). Some notable examples are the lack of adherence of impulsive patients to asthma control guidelines (Axelsson et al., 2009) and of patients suffering from anxiety to multiple sclerosis

disease-modifying therapies (Bruce et al., 2010). More relevant to the current article, Bogg and Milad (2020) have recently shown that adherence to COVID-19 guidelines was positively related to the personality trait of conscientiousness.

## THE PRESENT STUDY

In the current brief research report, we focus on two personality traits: mental rigidity (e.g., Webster and Kruglanski, 1994), and victimhood (Gabay et al., 2020a,b). As detailed, these traits are highly relevant due to the specific psychological characteristics of pandemic: uncertainty (Eichenberger et al., 2020) and fear (Ren et al., 2020).

### Mental Rigidity and Stressful Events

Mental rigidity received different names (such as need for closure, need for structure, tolerance of ambiguity, certainty orientation), each with its' own theoretical focus and variations (e.g., Webster and Kruglanski, 1994; Bar-Tal et al., 1997; Leone et al., 1999; Muluk and Sumaktoyo, 2010). Mental rigidity is the desire to reduce ambiguity through category-based processing and receive answers on given topics (Webster and Kruglanski, 1994). It leads to seeking simplified, one-sided information while disregarding more complex aspects of the situation (Sharifi, 2019), and psychological maladjustment to new situations (Kashima et al., 2017). This trait is of high relevance to stressful or uncertain circumstances, such as war, natural disasters, or disease (Kruglanski et al., 2002). Given the uncertainty around COVID-19 as a new virus with unprecedented spread, no vaccine, and dramatic consequences and measures, people high in mental rigidity may be more fearful than others (Webster and Kruglanski, 1994). Moreover, increased fear (Ren et al., 2020) should result in a greater tendency to follow health instructions, which may be perceived as a means to reduce uncertainty (Kruglanski et al., 2006). Mental rigidity was also related to reduced risk taking in various domains (Schumpe et al., 2017). A study conducted in the US during the COVID-19 pandemic revealed that anxiety related behavior patterns (e.g., stockpiling food) of mentally rigid people were greatly affected in such times of crisis (Brizi and Biraglia, 2020).

### Victimhood and Dealing With Life's Misfortunes

Trait victimhood is defined as "an ongoing feeling that the self is a victim ... generalized across many relationships, such that victimization becomes a central part of the individual's identity..." (Gabay et al., 2020a, p. 361). Victimhood fundamentally affects emotions, cognitions, and behaviors (Gabay et al., 2020b). Particularly relevant to this research, Gabay et al. (2020b) found that individuals with high levels of trait victimhood were more likely to interpret ambiguous situations as threatening through a black-and-white prism (Gabay et al., 2020b; see also Schori-Eyal et al., 2017). We argue that this recently introduced personality trait may offer a simple, yet powerful, measure of individual differences when facing hardships and misfortunes. Specifically, this trait is relevant to the behavioral guidelines of the pandemic since individuals high in victimhood are hyper-vigilant, neurotic, and susceptible to threat, which should increase their level of

fear. Such fear may lead to a greater tendency to follow health instructions (Ren et al., 2020). Nevertheless, the actual ability to follow the instructions, or lack thereof, can be captured by the concept of self-efficacy.

### Self-Efficacy and Adherence to Medical Instructions

The construct of self-efficacy was introduced by Bandura (1986) who defined it as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (p. 391). Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Though self-efficacy was mainly conceptualized as domain-specific, scholars have also suggested global self-efficacy (GSE) to describe people's global belief in their ability to cope with different challenges or uncertainties (Schwarzer et al., 1999). Bandura (1997) treated self-efficacy as the main factor in performance, postulating that motivation is affected by self-efficacy via goals selection. However, some argued that motivation, rather than self-efficacy, is central in determining future performance (Vancouver et al., 2001), and yet others postulated that the effect of self-efficacy varies along different levels of performance (Gur and Bar-Tal, under review).

We argue that GSE is relevant to the current endeavor as it captures one's perceived competence to effectively cope with challenging and stressful situations (Schwarzer et al., 1999; Judge and Bono, 2001). Indeed, self-efficacy was shown relevant to coping with health and medical situations. Specifically, past research has described how GSE affects adherence to medical instructions and health guidelines across various settings, ranging from dietary adherence (Warziski et al., 2008), to HIV medication adherence (Wolf et al., 2007). Since increased fear was found to motivate adaptive danger control actions (Witte and Allen, 2000), in the case of COVID-19, fear may represent one's strength of motivation to adhere to health guidelines. Therefore, we predicted that it may interact with GSE in affecting adherence to guidelines. Thus, we hypothesized that while fear should mediate the relationship between mental rigidity and trait victimhood and adherence to COVID-19 health guidelines, GSE would moderate the extent to which fear would in fact translate into actual adherence.

To summarize, the current research focuses on the relationship between mental rigidity, operationalized using the Need for Structure (NFS) scale, and trait victimhood, and adherence to COVID-19 health guidelines. This is based on previous research showing that mentally rigid individuals tend to be more fearful (Webster and Kruglanski, 1994), and that high trait victimhood individuals tend to mistrust others (Gabay et al., 2020b), which may also increase fear in the context of a pandemic. We hypothesized that mental rigidity and trait victimhood would be positively related to COVID-19 guideline adherence, and that fear would mediate these associations. Additionally, we hypothesized that GSE would moderate the extent to which fear would lead to guideline adherence, such that high- (vs. low-) GSE individuals would adhere more to the guidelines.

## METHOD

### Sample and Procedure

Three hundred and fifty four Israelis (48.6% women;  $M_{\text{age}} = 41.71$ ,  $SD = 16.02$ ) reported their mental rigidity (NFS), trait victimhood, GSE, fear of the coronavirus (COVID fear) and adherence to Israel's health department regulations regarding protection from the virus. Participants were recruited through an Israeli survey company (Midgam Project)<sup>1</sup>, responded electronically via the internet and were paid for their participation in the study. The data was collected from March 22nd until March 23rd, 3 days after emergency regulations were initiated in Israel (on March 19th) and 2 days after the first documented COVID-19 death in Israel (on March 20th)<sup>2</sup>. The study was reviewed and approved by the Interdisciplinary Center Herzliya Institutional Review Board (see ethics statement). All subjects provided informed consent to participate in the study. To protect the respondents' privacy, the survey was conducted anonymously.

### Measures

The presentation order of all scales and statements within them were randomized and all used a 7-point Likert-type scale ranging from "strongly disagree" (1) to "strongly agree" (7). We used the NFS scale to assess mental rigidity, since it has a short, validated, 11-item Hebrew version (Bar-Tal et al., 1997;  $\alpha = 0.82$ ). The *Trait victimhood* scale used an abridged version, consisting of nine statements ( $\alpha = 0.82$ ), of the scale developed by Gabay et al. (2020b). *COVID fear* was assessed by five statements, two of which (i.e., "I am very worried about being infected or infecting others that are close to me" and "I am afraid of corona disease") were adapted from a fear of cancer scale (Vrinten et al., 2015). We developed the three remaining statements for the purposes of the current research. They refer to a unique aspect of epidemics vs. other disease, i.e., the risk to oneself, to one's closest environment, and to the society in general ( $\alpha = 0.71$ ). The GSE scale used a modified version of Zeidner et al. (1993) Hebrew GSE 10-item scale (Weber et al., 2013;  $\alpha = 0.91$ ). *Guideline adherence* was assessed using two items we developed for the current study (i.e., "I make sure to wash my hands more often than I did before the coronavirus outbreak"; and "Since the coronavirus outbreak, I have been very careful to follow instructions (stay at home, reduce contact with people as much as possible, sneeze and cough into my elbow or tissue paper)";  $r = 0.43$ ,  $p < 0.001$ )<sup>3</sup>.

<sup>1</sup>We have chosen to use computerized questionnaire via a web based panel since past research indicated that online samples provide similar results to face-to-face samples, however, online samples tend to be more diverse (Casler et al., 2013). Midgam Project web panel was chosen as it includes over 50,000 panellists aged 17 years and older in Israel. It is one of the biggest panels in Israel, allowing its clients a representative sample of the population. It is highly regarded and used extensively for academic research and political surveys. Other variables (irrelevant to the current analysis) also collected in this survey will be published in a separate paper.

<sup>2</sup>On March 19th the Israeli government issued a stay-at-home order, limiting travel and work, except for essential needs such as getting food, medicines and medical or essential services, assistance to others in need, religious reasons, demonstration, blood donations and solitary sports.

<sup>3</sup>We omitted an additional item from this scale (i.e., "Adhering to the public guidelines is pointless, since we have no control over the disease's outbreak."), since

## RESULTS

For all variable means, SDs and correlations see **Table 1**. We tested our hypothesized moderated mediation path model, reasoning that our independent variables, i.e., NFS and trait victimhood, would lead to COVID fear, which in turn would lead to more guideline adherence; and that the association between COVID fear and guideline adherence would be moderated by GSE. We conducted a path analysis using Hayes's (2018) PROCESS (Model 14) bootstrapping command with 5,000 iterations controlling for participants age and gender<sup>4</sup>. Given that the PROCESS add-on cannot estimate a moderated mediation model with two parallel independent variables, we ran two models separately<sup>5</sup>: (1) indirect effect of NFS on guideline adherence through COVID fear, moderated by GSE, controlling for trait victimhood; and (2) the same model with trait victimhood as the independent variable, controlling for NFS.

Both models with either NFS or trait victimhood as the independent variables yielded similar pattern of results. Specifically, both NFS and trait victimhood's total effects on guideline adherence (see **Table 1**) were no longer significant when the mediator, COVID fear, and its interaction with GSE were introduced into the models ( $\beta = 0.04$ ,  $SE = 0.05$ ,  $p = 0.428$ , 95% CI [-0.06, 0.15], and  $\beta = 0.06$ ,  $SE = 0.05$ ,  $p = 0.266$ , 95% CI [-0.04, 0.16], respectively). Guideline adherence was predicted by COVID fear ( $\beta = 0.45$ ,  $SE = 0.05$ ,  $p < 0.001$ , 95% CI [0.35, 0.55]) and by the COVID fear X GSE interaction ( $\beta = -0.16$ ,  $SE = 0.05$ ,  $p = 0.001$ , 95% CI [-0.25, -0.06]; see **Figure 1**).

To probe the interaction, we used simple slope analysis (Aiken and West, 1991). GSE was fixed at 1 SD below the mean, corresponding to low-GSE participants, and 1 SD above the mean, corresponding to high-GSE participants. Conditional effects showed that for low-GSE participants, COVID fear significantly predicted guideline adherence ( $\beta = 0.61$ ,  $SE = 0.08$ ,  $p < 0.001$ , 95% CI [0.45, 0.76]); while for high-GSE participants the effect of COVID fear on guideline adherence was still significant, but considerably smaller ( $\beta = 0.29$ ,  $SE = 0.06$ ,  $p < 0.001$ , 95% CI [0.17, 0.42])<sup>6</sup>.

Finally, the COVID fear X GSE interaction yielded a significant indirect effect via COVID fear for low-GSE

we realized that it did not directly address guideline adherence, and it also reduced the reliability of the scale.

<sup>4</sup>Since the study was cross-sectional, we controlled for age and gender to eliminate potential alternative explanations. The same pattern of results appears when not controlling for participants' age and gender.

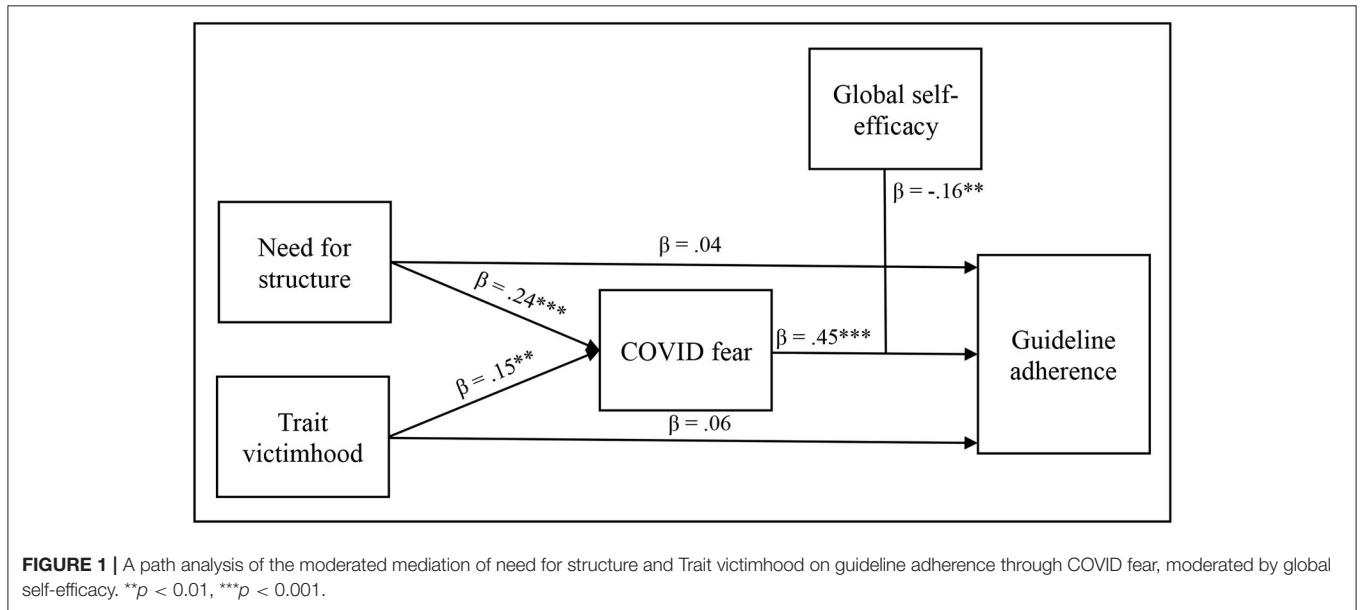
<sup>5</sup>The two conducted PROCESS analyses represent one hierarchical regression, in which need for structure and trait victimhood are in the first step; COVID fear, general self-efficacy and the interaction between them are in the second step; and guideline adherence is the result variable. To receive the indirect effects for both IVs, we used the PROCESS add on. However, due to a technical limitation, the PROCESS add-on can calculate the indirect effect for only one IV at a time. To overcome this limitation, we conducted two analyses: in the first, trait-victimhood was the IV while need-for-structure was controlled for; and in the second need-for-structure was the IV while trait-victimhood was controlled for.

<sup>6</sup>Examining the interaction between COVID fear and GSE with COVID fear fixed at 1 SD below and above the mean indicated that for low fear participants GSE significantly predicted guideline adherence ( $\beta = 0.39$ ,  $SE = 0.07$ ,  $p < 0.001$ , 95% CI [0.26, 0.52]); but not for high fear participants ( $\beta = 0.08$ ,  $SE = 0.07$ ,  $p = 0.274$ , 95% CI [-0.06, 0.22]).

**TABLE 1** | Means, SDs and correlations of all variables.

	Mean (SD)	1	2	3	4	5	6	7
Guideline adherence	5.99 (1.03)	–						
COVID fear	4.92 (1.13)	0.44***	–					
Need for structure	4.88 (0.88)	0.20***	0.30***	–				
Trait victimhood	4.54 (0.99)	0.20***	0.25***	0.39***	–			
Global self-efficacy	5.33 (0.85)	0.25***	0.01	–0.06	0.14**	–		
Age	41.71 (16.02)	0.06	0.10	–0.04	0.003	0.01	–	
Gender (1 = M, 2 = F)	–	0.13*	0.09	0.15**	0.09	0.04	0.02	–

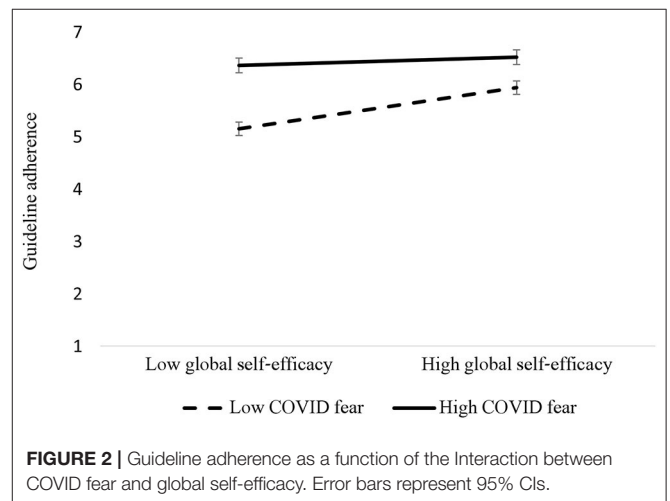
\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .



participants in both the NFS and trait victimhood models ( $\beta = 0.15$ ,  $SE = 0.04$ , 95% CI [0.07, 0.22], and ( $\beta = 0.09$ ,  $SE = 0.04$ , 95% CI [0.02, 0.17], respectively). The indirect effect via COVID fear was still significant for high-GSE participants in both the NFS and trait victimhood models ( $\beta = 0.07$ ,  $SE = 0.02$ , 95% CI [0.03, 0.12], and  $\beta = 0.04$ ,  $SE = 0.02$ , 95% CI [0.01, 0.08], respectively), but considerably smaller, yielding both moderated mediation models to be significant ( $index = -0.04$ ,  $SE = 0.02$ , 95% CI [-0.07, -0.01], and  $index = -0.02$ ,  $SE = 0.01$ , 95% CI [-0.05, -0.002], respectively; see Figure 2).

**DISCUSSION**

In the current brief research report, we suggested that adherence to authorities COVID-19 health guidelines is associated with mental rigidity, operationalized as NFS, and trait victimhood. Our model suggests that these traits may be associated with guideline adherence through an indirect effect of fear of the pandemic. However, the extent to which fear predicted guideline adherence was moderated by GSE, such that for low-GSE, the extent to



which participants feared the pandemic had a significantly bigger effect on guideline adherence, compared to the high-GSE participants.



Adherence to the COVID-19 health guidelines is dependent upon various factors. In some cases, adherence to guidelines issued by the authorities is predominately dependent upon the ability to do so, such as those considered emergency workers. Some cannot afford not to work if they do not get paid sick leave. And in other cases, people cannot properly practice social distancing if they live in densely populated neighborhoods (e.g., Bouie, 2020). For those who *are* able to adhere to the guidelines, we argue and show evidence that specific personality traits may be important factors affecting adherence.

Considering mental rigidity, we argue that a pandemic of such magnitude involves great uncertainty and fear for those high in mental rigidity, and thus following the guidelines might reduce this uncertainty (Kruglanski et al., 2006). Regarding trait victimhood, people high in this tendency may be fearful of the pandemic, due to their general tendency to be vigilant to potential harm. This, in turn, should lead to more adherence to hand washing and practicing social distancing due to high-victimhood individuals' self-reliance in protecting themselves, as well as their perceptions of moral superiority (Gabay et al., 2020a,b).

Interestingly, while victimhood has mostly been shown to lead to negative consequences, especially in the realm of interpersonal and intergroup relations (e.g., Gabay et al., 2020a; Vollhardt, 2020), the current research suggests it might also have positive outcomes for the individual and possibly for the community. Furthermore, unexpectedly, we found that trait victimhood was positively associated with GSE. Although trait victimhood should be distinguished from actual experienced victimization, which is characterized perception of powerlessness, this finding is interesting and should be examined in future studies.

In terms of possible implications of the current research, due to the great importance of pandemic related messages, they should be perfected to lead to favorable results. In today's world, in which so many messages are imparted via social networks, social marketers trying to promote more COVID-19 related guideline adherence can enhance their messages' effectiveness using tailored, or personalized messaging (e.g., Hirsh et al., 2012; Halperin and Schori-Eyal, 2020). Indeed, the literature on attitude change has long established that the effectiveness of a message is not only based on the message itself, but also on the message source, the medium, and the characteristics of the message recipient (Hovland et al., 1953; Greenwald, 1968). Yet, while most research has focused on the different messages used (e.g., Maaravi et al., 2011), differential characteristics of recipients may also influence the results of the persuasion attempt. The current research provides preliminary indications that individuals with high levels of mental rigidity and/or trait victimhood, might be more susceptible to messages that describe the risk of the COVID-19 pandemic, which might increase their compliance with the guidelines. Interestingly, we found that age, which has played a pivotal role in the deadliness of the pandemic (e.g., Remuzzi and Remuzzi, 2020), as well as with guideline

adherence (Bogg and Milad, 2020), was neither significantly correlated with COVID fear nor with guideline adherence. This suggests that perhaps messaging that does not rely on emphasizing the potential risk could resonate more with older message recipients.

At this point, it should also be noted that the hypothesized independent variables in our model are personality traits, which in theory should precede and predict a response to a current event. Yet, the current research is correlational, and we cannot draw any firm conclusions regarding the causal relationships between the variables. Future research should attempt to establish causality by, for example, priming of a sense of victimhood (e.g., Baumeister et al., 1990) and then exploring its effects on fear and guideline adherence.

## CONCLUSION

In conclusion, the current report has pointed to the possible role mental rigidity, trait victimhood, and GSE play in fearing the COVID-19 pandemic, as well as in adhering to the guidelines issued by the authorities. Our model suggested that mental rigidity and trait victimhood both predicted fear of COVID-19, which in turn translated into more guideline adherence. High levels of fear yielded high levels of guideline adherence. However, when fear was not particularly high, participants' GSE was also associated with more guideline adherence. We argue that the current research may contribute to our understanding of how personality traits shape responses to adversities, as well as to the development of more effective messaging to promote message recipients' compliance with guidelines issued by the authorities.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available at [https://osf.io/rqbxu/?view\\_only=11b5049cb83943deaf87d01c448b2540](https://osf.io/rqbxu/?view_only=11b5049cb83943deaf87d01c448b2540).

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Institutional Review Board, IDC Herzliya Adelson School of Entrepreneurship (IRB # YMCD19003). All subjects provided informed consent to participate in the study. To protect the respondents' privacy, the survey was conducted anonymously. All procedures were in accordance with the Declaration of Helsinki.

## AUTHOR CONTRIBUTIONS

YM: study design, data interpretation, writing, and literature search. BH: study design, data interpretation, writing, and figures. TG: data collection, data analysis, writing results, and figures. All authors contributed to the article and approved the submitted version.

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# Does COVID-19 Impact Less on Post-stroke Aphasia? This Is Not the Case

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**Background:** The coronavirus disease 2019 (COVID-19) pandemic has greatly affected people's mental health resulting in severe psychological consequences. One of the leading causes of long-term disability worldwide is aphasia. The language changes experienced by a person with aphasia (PWA) often have a sudden and long-lasting negative impact on social interaction, quality of life, and emotional wellbeing. The main aim of this study was to investigate the impact of COVID-19 on the different psychosocial dimensions which affect PWA.

**Methods:** This retrospective study included 73 PWA and 81 elderly matched controls. All patients were in the chronic phase. They were all discharged from rehabilitation services, which left them with different degrees of language deficits (i.e., severe vs. mild vs. moderate). All participants were administered the hospital anxiety and depression scale (HADS) through an online survey. PWA also took part in the stroke and aphasia quality of life scale questionnaire (SAQOL-39).

**Results:** Although the comparison between two different time points [one month before (T0) and one month after the lockdown (T1)] led to a significant increase in depression and anxiety symptoms in both groups (PWA vs. control), lower rates of depression and anxiety were found in PWA compared to the healthy group. Significant deterioration was also present in PWA in the communication and psychosocial scales of the SAQOL-39 test, which correlated with the observed changes in the psychological domains. Interestingly, the results were not significantly influenced by the degree of aphasia severity. Similarly, in both groups, none of the demographic variables (gender, age, and educational level) significantly affected the scores in the different subscales.

**Conclusions:** This evidence which, at first glance, seems to suggest that PWA have been partially spared from the impact of COVID-19, actually masks a dramatic situation that has always characterized this population. Indeed, given that PWA already live in a state of social isolation and emotional instability, these conditions might have, paradoxically, limited the effects of the coronavirus. However, as our results showed a deterioration in the emotional state and communication skills of our patients, possible solutions are discussed in order to prevent further decline of their cognitive abilities.

**Keywords:** COVID-19, aphasia (language), stroke, depression, anxiety, psychosocial well being



## INTRODUCTION

First identified in China in late 2019, the coronavirus disease 2019 (COVID-19) emergency has become a global pandemic, spreading all over the world within a short period of time, including Italy (Şencan and Kuzi, 2020; World Health Organization [WHO], 2020). On March 8, 2020, the Italian Government implemented extraordinary measures to limit viral transmission, restricting movement in all regions of Italy using stay-at-home orders and lockdowns, limiting physical contact between people with the months-long suspension of commercial, educational, and social activities (Soraci et al., 2020). Given the unknown causes of the infection, the poor knowledge of its transmission, the unpredictability of the duration, and the high risk of mortality, the outbreak of COVID-19 led to severe physical and psychological consequences for people's health (Brooks et al., 2020; Kang et al., 2020; Li et al., 2020; Moccia et al., 2020). Indeed, all over the world people are still mostly affected by negative emotions (i.e., depressive symptoms, anxiety, high stress levels, confusion, post-traumatic stress disorders, and insomnia) and negative cognitive assessment for self-protection (i.e., feelings of helplessness and fear of falling sick or dying), breaking the balance of daily activities, and decreasing the perception of wellbeing (Brooks et al., 2020; Kang et al., 2020; Li et al., 2020; Moccia et al., 2020). The work of Santini and collaborators (Santini et al., 2020) also reported a strong correlation between social isolation and high rates of anxiety and depression in both healthy young and older adults.

Since COVID-19 has resulted in serious negative psychological consequences in different populations, we wonder whether coronavirus has also dramatically affected people with brain damage, and, in particular, persons with post-stroke aphasia (PWA).

As is well known, stroke is one of the leading causes of long-term disability worldwide (Feigin et al., 2015). After a stroke, survivors can experience a wide range of difficulties, among them aphasia, which is one of the most serious socially disabling consequences. Aphasia, the loss of ability to produce and/or to understand language, manifests itself in about one-third of left brain-damaged people (30% of acute vs. 10–20% of chronic stroke patients, Ali et al., 2015). The aphasic symptoms are heterogeneous, varying in terms of severity and degree of involvement across the modalities of language, including the expression and comprehension of speech, reading, and writing. Variation in the severity of expressive impairments, for example, may range from the patient's occasional inability to find the correct word to telegraphic and very reduced speech output. Thus, PWA experience frustration and depression since their exclusion from language-dependent activities has strong implications for many aspects of their emotional condition and social status. Indeed, the language changes experienced by PWA often have sudden and long-lasting negative impacts on friendships, social engagements, quality of life, and psychological wellbeing (Engelter et al., 2006; Spaccavento et al., 2014; Mattioli, 2019). Less curiosity and less emotional stability with anxiety and depression, distress, social exclusion, and loss of autonomy are frequently reported symptoms in aphasic people (Kouwenhoven

et al., 2011; Ayerbe et al., 2014; Hackett and Pickles, 2014; Feigin et al., 2015; Robinson and Jorge, 2016; Mitchell et al., 2017; Kirkevold et al., 2018; Torres-Prioris et al., 2019). In particular, regardless of the degree of language impairment, the patient tends to isolate him/herself and to have less intrinsic motivation in taking part in language rehabilitation programs since he/she feels oppressed by negative feelings (Cott et al., 2007; Woodman et al., 2014; Foley et al., 2019; Hjelle et al., 2019). Accordingly, several studies have already pointed out that PWA have a quality of life worse than non-aphasic patients (Spaccavento et al., 2014; Wray and Clarke, 2017; Kirkevold et al., 2018; Hjelle et al., 2019).

Considering that COVID-19 has dramatically maximized the risk of social isolation and associated depression, in the present study, we wanted to investigate if the psychosocial difficulties experienced by PWA would have worsened due to coronavirus. Indeed, language problems limit the use of digital media (i.e., cellular and/or social networks) in order to maintain social contact. Thus, aphasic patients could not even rely on these social means, as other stroke or healthy people do, to compensate for the lack of social interaction imposed by the coronavirus.

As far as we know, to date, no study has explored the effects of COVID-19 on patients with chronic post-stroke aphasia.

In this exploratory retrospective study, we investigated the psychological impact of the COVID-19 outbreak on a group of chronic PWA matched with a control group of elderly participants by comparing their psychological state one month before (T0) to one month after lockdown.

## DESIGN AND PARTICIPANTS

The study design was an interview-based psychometric study. Seventy-three patients with post-stroke aphasia were recruited from two different speech and language therapy (SLT) service providers in Italy, one in Rome and the other in Turin.

All patients were already discharged from rehabilitation services before the COVID-19 emergency. They were all native Italian speakers with right premorbid manual dominance, affected by a single left hemispheric stroke occurring at least one year prior to experimentation. They were all cared for by a caregiver and lived at home before the stroke. No patients presented a history of severe cognitive decline, mental health problems, alcohol or drug abuse, head injury, or tumoral lesions. None of the participants had received structured language therapy for at least 6 months before the time of inclusion in the study in order to prevent confounding therapy effects. A group of 81 age- and education-matched elderly individuals were also recruited to serve as normal controls. They were all retired from work and they mostly stayed at home.

Persons with post-stroke aphasia had a mean age of 64.52 years ( $SD \pm 9.85$ ), 41 (56%) were male and 32 (44%) were female. The mean educational level was 11.88 ( $SD \pm 3.85$ ). For the control group, the mean age was 68.11 years ( $SD \pm 10.08$ ), 38 (47%) were male and 43 (53%) were female. The mean educational level was 11.27 ( $SD \pm 4.07$ ). The two groups did not significantly differ in age, educational level, and gender from each other. According to their age, all participants were subdivided into three groups: (1)



40–55 years (12 PWA, 11 controls), (2) 55–70 years (36 PWA, 34 controls), and (3) 70–85 years (25 PWA, 36 controls). According to the educational level, three different groups were identified: (1) 5–8 years (26 PWA, 37 controls), (2) 8–13 years (30 PWA, 26 controls), and (3) 13–17 years (17 PWA, 18 controls).

## Ethical Approval

An ethical review and approval were not required for the study on human participants in accordance with the local legislation, institutional requirements, and the legislation governing the psychologist profession (L.56/89). Written informed consent to participate in the study was provided by the patients.

## Procedure and Outcome Measurements

We used the Esame del Linguaggio II (Ciurli et al., 1996) and the Aachen Aphasia Test (AAT, Luzzatti et al., 1996) to screen for aphasia. According to their AAT score (Luzzatti et al., 1996), all patients were divided into three groups: 30 with severe/global aphasia (13 males and 17 females; age  $65.07 \pm 10.21$ ; education level  $10.60 \pm 3.64$ , AAT score: 1–3); 28 with moderate aphasia (18 males and 10 females; age  $63.75 \pm 8.36$ ; education level  $13.11 \pm 3.98$ ; AAT score: 4–5), and 15 with mild aphasia (10 males and 5 females; age  $64.87 \pm 12.08$ ; education level  $12.13 \pm 3.40$ ; AAT score: 6–7). Both the groups (PWA vs. control) were first contacted via telephone or e-mail, and those patients who gave their informed consent to the study were invited to take part in the survey. The online survey took around 20 min to be completed. The questionnaires were administered online to healthy people through forums and social network communities. In order to ensure that PWA could be assisted during the survey, the questionnaires were administered to the patients through Skype, a telecommunication platform specialized in providing video-chat and voice calls. The survey was anonymous and data confidentiality was assured. Depressive symptoms and anxiety were measured through the hospital anxiety and depression scale (HADS). Both the subscales consist of seven items scored on a 4-point Likert scale (0–3), yielding a maximum score of 21. A cut-off score =8 was established to indicate pathological symptoms of depression or anxiety (Aben et al., 2002; Bjelland et al., 2002). The HADS scales have good internal consistency, good to excellent sensitivity and specificity, and good to very good concurrent validity (Aben et al., 2002; Bjelland et al., 2002). We used the stroke and aphasia quality of life scale (SAQOL-39), an interview-administered self-report scale to measure general dimensions of stroke-specific, health-related quality of life. The SAQOL-39 was validated for use in people with and without aphasia (Hilari et al., 2003, 2009). The questionnaire was comprised of 39 items grouped into 4 subdomains: physical, psychosocial, communication, and energy, which are the most affected areas in post-stroke patients (Parr et al., 1997; Duncan et al., 1999; Williams et al., 1999). The SAQOL has two response formats, both based on a 5-point scale: 1-could not do it at all to 5-no trouble at all and 1-definitely yes to 5-definitely no. Overall, subdomain scores can range from 1 to 5. The overall SAQOL score is calculated by adding across the items and dividing by the number of items; subdomain scores are calculated in the same way. Higher scores indicate a higher quality of life.

The questionnaire has high validity and reliability in aphasic individuals and it is sensitive to changes (Hilari et al., 2003, 2009). Each questionnaire included two protocols, which were administered in a counterbalanced order across the groups. For each protocol, the questions were the same but they compared the psychological state of each participant between two distinct time periods: one month before (T0) and one month after the lockdown (T1).

## Data Analyses

All statistical analyses were conducted with IBM SPSS Statistics 22 software. For each group (PWA vs. control), paired *t*-tests were calculated on the mean score differences between the two time points: pre (T0)- and during (T1) COVID-19 in the different questionnaires. Two separate mixed ANOVAs were also performed for each subscale (anxiety vs. depression) of the HADS questionnaire with group as the between-subjects variable (PWA vs. control) and time as the within-subjects variable (T1 vs. T0). The primary analysis was the group-by-time interaction. The values of  $p < 0.05$  were considered statistically significant. In both groups, correlational analyses (Pearson's *r*-coefficient) were also conducted on the mean score differences among the different subscales between the two time points (T1 vs. T0).

To evaluate the impact of aphasia severity on the PWA's responses in the different questionnaires, separate mixed model ANOVAs were also performed. We also analyzed the influence of gender, age, and educational level on the results collected in the two groups through two samples *t*-test comparisons (gender), the Kruskal–Wallis test (age), and a mixed-model ANOVA (educational level).

For each variable, in order to evaluate its statistical power, the values of the effect size were entered using the partial  $\eta^2$  index and the observed power index which SPSS software automatically associates with the ANOVA.

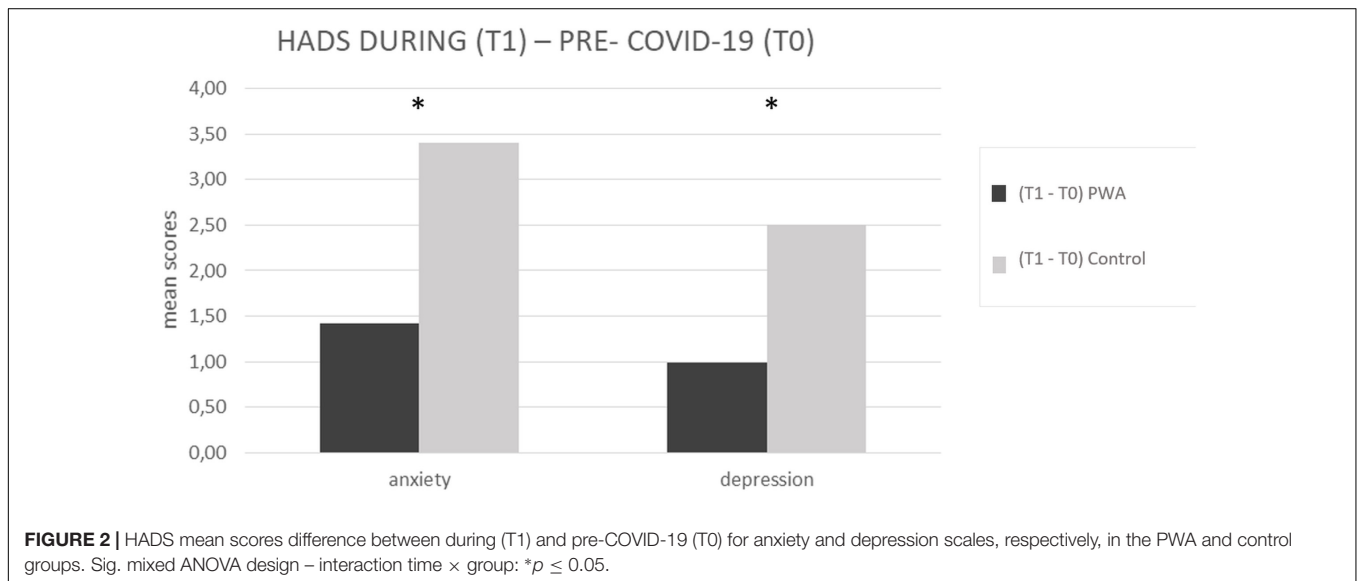
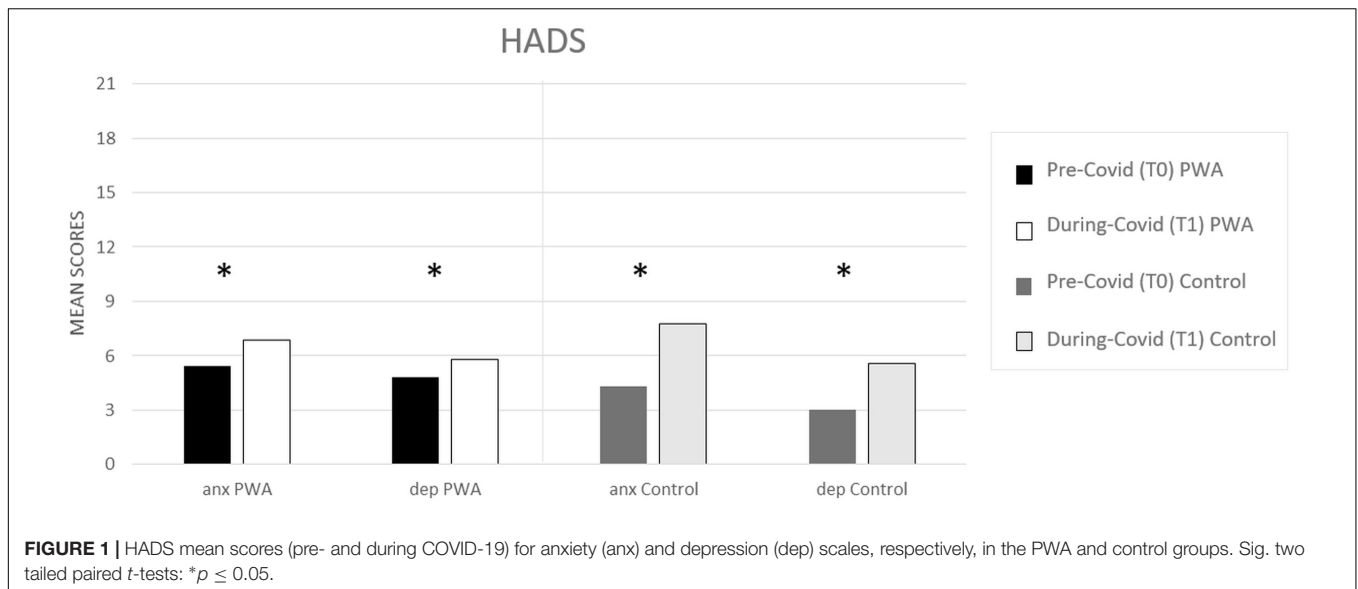
Our sample size was determined with the G\*Power 3.1.9.2 software (Faul et al., 2009). It was calculated that a sample size of at least 54 subjects per group was required to obtain an expected effect size of  $d = 0.51$  (at 80% power;  $\alpha = 0.05$ ). Therefore, our samples were considered large enough to generalize the results to the reference population.

## RESULTS

### Anxiety and Depression Scales

In both groups, the prevalence of depressive symptoms and anxiety increased significantly between T0 (pre) and T1 (during COVID-19) (PWA: T0 5 vs. T1 = 6,  $p = 0.000$  and T0 5 vs. T1 = 7,  $p = 0.000$ , respectively, for depression and anxiety; controls: T0 3 vs. T1 = 6  $p = 0.000$  and T0 4 vs. T1 = 8,  $p = 0.000$ , respectively, for depression and anxiety) (see **Figure 1**) as revealed by the paired *t*-tests.

The mixed ANOVA design performed on the anxiety levels of the HADS questionnaire revealed a significant effect of time (T1 vs. T0) [ $F(1,152) = 107.5$ ,  $p < 0.001$ , partial  $\eta^2 = 0.414$ , and observed power = 1.000] and no significant effect of group (PWA vs. control) [ $F(1,152) = 0.046$ ,  $p = 0.831$ , partial  $\eta^2 = 0.000$ , and



observed power = 0.055]. The interaction time  $\times$  group was also significant [ $F(1,152) = 18.1, p < 0.001$ , partial  $\eta^2 = 0.106$ , and observed power = 0.988] showing that the anxiety levels were greater in the control group than in the PWA (T1–T0 controls = 4 vs. T1–T0 PWA = 2,  $p < 0.001$ ) resulting above the cut-off score (Aben et al., 2002; Bjelland et al., 2002) (see **Figure 2**).

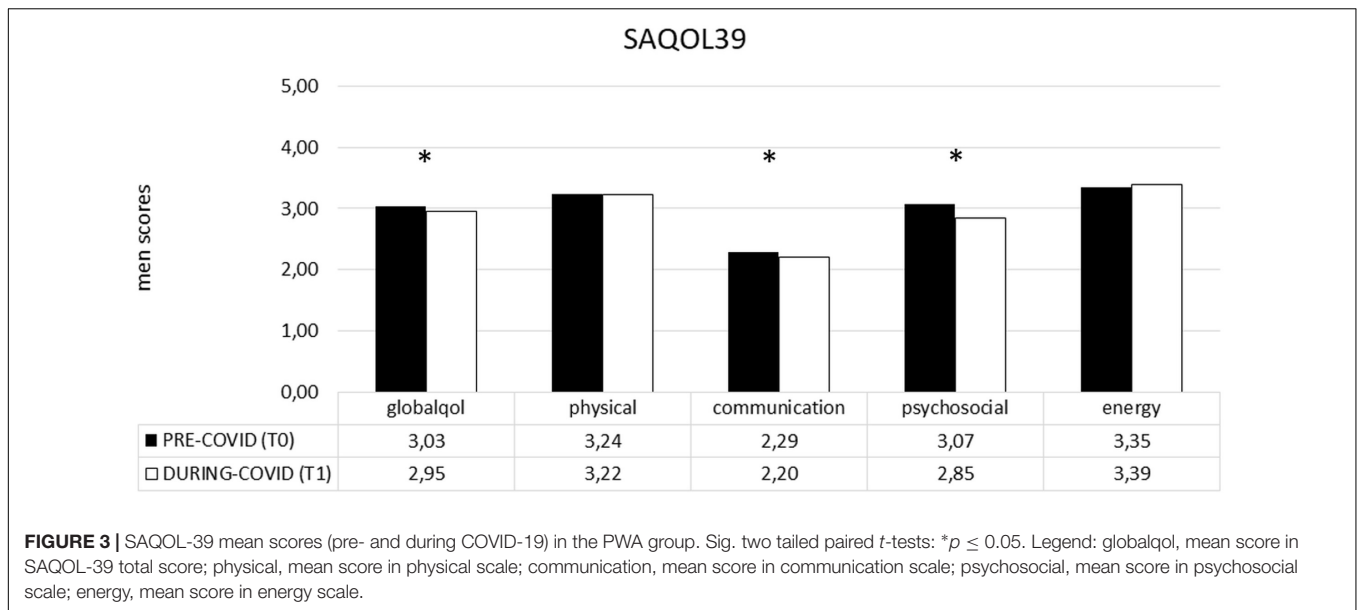
The mixed ANOVA design performed on the depression levels of the HADS questionnaire revealed a significant effect of time (T1 vs. T0) [ $F(1,152) = 73.8, p < 0.001$ , partial  $\eta^2 = 0.327$ , and observed power = 1.000] and a significant effect of group [ $F(1,152) = 4.5, p = 0.035$ , partial  $\eta^2 = 0.029$ , and observed power = 0.562]. The interaction time $\times$ group was also significant [ $F(1,152) = 13.9, p < 0.001$ , partial  $\eta^2 = 0.84$ , and observed power = 0.960] showing that the depression levels were greater in the control group than in the PWA (T1–T0 controls = 3 vs. T1–T0 PWA = 1,  $p < 0.001$ ) (see **Figure 2**).

### SAQOL-39 Scale

In the PWA group, the difference between the two time points (T1–T0) revealed that COVID-19 significantly impacted on the SAQOL-39 total score and, specifically on the communication and psychosocial domain. Indeed, the mean score was significantly lower at T1 than at T0, showing a significant deterioration of the performance in both areas (communication: T0 2,29 vs. T1 2,20 and  $P = 0.019$ ; psychosocial: T0 3,07 vs. T1 2,85 and  $P = 0.001$ ) (see **Figure 3**).

### Correlational Analyses

In both groups (PWA vs. control), the analyses (Pearson's *r*-coefficient) performed on the mean percentage difference between the two time points (T1 vs. T0) revealed positive correlations ( $p \geq 0.05$ ) among the anxiety and depression scales



**FIGURE 3 |** SAQOL-39 mean scores (pre- and during COVID-19) in the PWA group. Sig. two tailed paired *t*-tests: \* $p \leq 0.05$ . Legend: globalqol, mean score in SAQOL-39 total score; physical, mean score in physical scale; communication, mean score in communication scale; psychosocial, mean score in psychosocial scale; energy, mean score in energy scale.

(HADS) and the different subdomains of the SAQOL-39 scale. Only the psychosocial and the communication subdomains of the SAQOL-39 test were not correlated to each other.

### Influence of Aphasia Severity, Gender, Age, and Educational Level

Three separate mixed model ANOVAs performed with aphasia severity (severe – moderate – mild), as a between-subject factor, and time (T0–T1), as a within-subject factor, revealed that the detected changes between the two time points in the level of depression and anxiety of PWA and in the two subdomains of the SAQOL-39 questionnaire (communication and psychosocial area) were not significantly affected by the degree of aphasia severity. Similarly, when the variables, gender, age, and educational level were investigated, none of these factors significantly affected the scores in the different subscales.

However, the *post hoc* comparison between the three groups (severe vs. moderate vs. mild), showed that the severe group had a higher degree of anxiety and depression and worse performance in the different subscales of the SAQOL-39 questionnaire than the other two groups (moderate and mild), which differed from each other only in the communication scale (see **Table 1**).

## DISCUSSION

The main aim of the present study was to investigate the impact of the COVID-19 outbreak on different psychosocial dimensions, such as depression, anxiety, communication, and social isolation in persons with chronic post-stroke aphasia (PWA). A group of elderly matched controls also took part in the study. For the purpose of our work, it is necessary to highlight that all patients were already discharged from rehabilitation services before COVID-19 and they all lived at home with a caregiver.

**TABLE 1 |** Bonferroni *post hoc* comparisons between the three aphasic groups (severe vs. moderate vs. mild).

Variable	Groups comparison	<i>p</i> -value
Hads-anxiety scale	Severe vs. moderate	0.001
	Severe vs. mild	0.015
Hads-depression scale	Severe vs. moderate	0.008
	Severe vs. mild	0.041
SAQOL-39 – total score	Severe vs. moderate	0.000
	Severe vs. mild	0.000
SAQOL-39 – physical	Severe vs. moderate	0.000
	Severe vs. mild	0.000
SAQOL-39 – communication	Severe vs. moderate	0.014
	Severe vs. mild	0.000
	Moderate vs. mild	0.000
SAQOL-39 – psychosocial	Severe vs. moderate	0.010
	Severe vs. mild	0.000
SAQOL-39 – energy	Severe vs. moderate	0.009
	Severe vs. mild	0.006

Overall, results indicated that during the COVID-19 pandemic, both groups (PWA vs. control) scored significantly higher on the anxiety and depression subscales of the HADS questionnaire compared to the pre-COVID-19 condition. Moreover, although before the pandemic, the control group performed in the normal range with respect to the aphasic population, during the coronavirus, they reached significantly higher levels in both subscales, which even exceeded the cut-off score of the anxiety scale.

Thus, in line with several recently published studies, our work confirms that the COVID-19 emergency has dramatically affected the emotional state of the healthy population leading to an increase of depressive and anxiety symptoms (Brooks et al., 2020; Kang et al., 2020; Li et al., 2020; Moccia et al., 2020;

Santini et al., 2020). It has already been suggested that the distorted perception of risk with fear and uncertainty experienced during the COVID-19 outbreak, along with the separation from loved ones and the limitations on freedom, have made a strong impact on mental health with an increase of negative emotions (Brooks et al., 2020). Accordingly, our healthy group reported emotional distress, low mood with depression, and anxiety. However, surprisingly, lower rates of depression and anxiety were found in PWA compared to the control group. These results, which, at first glance, may seem positive, actually mask a dramatic situation which affects aphasic people. Indeed, as stated in the Introduction, the anxiety and the depressive symptoms associated with poor social functioning, low quality of life, and poor functional abilities are frequently reported conditions in aphasic stroke survivors in the long term (Aström, 1996; Robinson, 1997; D'Alisa et al., 2005; Hilari et al., 2012; Jeong et al., 2012; Campbell Burton et al., 2013; Tang et al., 2013; Eccles et al., 2017). Normally, negative emotions are more pervasive in aphasic people than in healthy subjects, since their exclusion from language-dependent activities dramatically impacts their emotional wellbeing and social life (Engelter et al., 2006; Spaccavento et al., 2014; Baker et al., 2018; Mattioli, 2019; Pompon et al., 2019). In particular, as already stated, the patient tends to isolate his/herself and to have less intrinsic motivation in taking part in social relationships since he/she feels oppressed by negative symptoms (Cott et al., 2007; Woodman et al., 2014; Foley et al., 2019; Hjelle et al., 2019).

Thus, given that aphasic people already live in a state of social isolation, the virus had a paradoxically greater psychological impact on the control group (Spaccavento et al., 2014; Kirkevold et al., 2018). However, it is worth noting that the levels of anxiety and depression during COVID-19 have worsened in the aphasic population too. More importantly, since we also found a deterioration of their performance on the communication and psychosocial scales of the SAQOL-39 questionnaire which was positively correlated with their emotional status, we cannot exclude the possibility that these patients, already discharged from rehabilitation services, manifested a relapse on their communication skills due to the worsening of their psychological symptoms. Given these results, we believe that we must take into serious consideration not only the risks of COVID-19 on healthy people but also its impact on a population that is no longer benefiting from rehabilitation services. In fact, unlike what is often suggested by the literature (Thomas and Lincoln, 2008; Hilari and Byng, 2009; Hilari et al., 2012), we found no specific influence of aphasia severity with respect to the changes observed in anxiety, depression, communication, and psychosocial wellbeing. In other words, although there is a general agreement that aphasia severity correlates with patient performance (Thomas and Lincoln, 2008; Hilari and Byng, 2009; Hilari et al., 2012), in our study, the highest levels of anxiety and depression and the lowest rates in the communicative and psychosocial scales were independent of aphasia severity. Thus, COVID-19 had equally affected our three selected groups of aphasics. Similarly, no influences were found among the different demographic variables taken into consideration (educational level, age, and gender).

Given the current dramatic impact of COVID-19 on clinical services, although our aphasic population was already discharged from rehabilitation, our results point to the urgency of implementing new strategies and possible interventions for them. A very recent study (Bersano and Pantoni, 2020) also confirmed this need for acute stroke patients who, due to COVID-19, suffered from a shortage of services and delays in time-dependent treatments and diagnostic work-up. In order to circumscribe the consequences of the COVID-19 pandemic, one possible strategy might be to set up tele-rehabilitation and home-based services, which have been already successfully implemented for aphasia rehabilitation (Zhou et al., 2018; Gerber et al., 2019; Chang and Boudier-Revéret, 2020) and to focus on specific rehabilitation programs which allow the patients, who are no longer followed-up in therapy, to keep training their communication skills, and avoiding further deterioration. This would not add excessive costs to the healthcare system since it could be easily supported by the patients' families.

Before concluding, it is worth noting that one possible limitation of our study is that our aphasic population was not entirely representative of the stroke population. Thus, our results do not allow for an advance in any final conclusion regarding the impact of COVID-19 on post-stroke people in general. However, since we strongly believe that one of the most serious socially disabling consequences after stroke is aphasia which does not offer the opportunity, as in other post-stroke syndromes, to communicate remotely, our results point to the urgency of taking into serious consideration the dramatic impact that COVID-19 has had on these patients.

In conclusion, since global attention is currently focused on clinical populations who, prior to COVID-19 were followed-up in rehabilitation services, our results point to the need of also considering the already discharged patients. For this population, we recommend they access home-based remote services in order to promote adaptive behaviors, reduce negative feelings, and prevent further deterioration of their cognitive performances.

## DATA AVAILABILITY STATEMENT

The data will be available upon request.

## ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation, institutional requirements and the legislation governing the psychologist profession (L.56/89). Written informed consent to participate in the study was provided by the patients.

## AUTHOR CONTRIBUTIONS

FP and PM designed the research and wrote the manuscript. FP, CR, and MC performed the research. MC, CR, and AG analyzed the data. PM and AG edited the manuscript. All authors contributed to the article and approved the submitted version.



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# COVID-19: A Psychosocial Perspective

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The World Health Organization declares coronavirus disease 2019 (COVID-19) as a pandemic, and The World Economic Forum argues that the COVID-19-induced global lockdown is the biggest psychological experiment. This study is an attempt to empirically evaluate the possible adverse psychosocial effects caused by COVID-19-related lockdown, if any. To do so, a cross-sectional study is conducted based on a comprehensive online survey using snowball sampling to analyze the level of social and psychological impacts (i.e., stress, belief in stakeholders, fear of losing job, and life satisfaction) during the early stage of the outbreak in Pakistan. The questionnaire is filled out by the residents in Pakistan including working professionals and students (sample size is 428). We find that the development of stress due to COVID-19-induced lockdown is particularly because of mood swings. Additionally, a higher prevalence of stress in the children of highly educated mothers is evident (95% confidence). To assess the belief in stakeholders, we focus gender, demographics, and education. It is observed that parental education and age significantly affect the belief in several stakeholders (i.e., government, media, religious clerics, and family). The lockdown-induced fear of losing job is lower in female and male children whose fathers are graduates. Lastly, we observe that food storage and “no fear of losing job” significantly increases the odds of life satisfaction. These findings have important implications in the context of social insurance, parental education, and policy related to COVID-19 at various levels. This study further facilitates to understand the factors that might affect the mental health and life satisfaction of people during such pandemics.

**Keywords:** public health, psychology, stress, COVID-19, well-being

## INTRODUCTION

The world is facing one of the most dangerous challenges in our lifetime due to the outbreak of the novel coronavirus (COVID-19), which has now spread to almost every country (211 countries and territories to be specific) on the global map (Pettersson et al., 2020). The effects caused by COVID-19 apart from adverse health are becoming eminent in different dimensions such as social, psychological, and economic. COVID-19 affected the first patient in late November 2019, and the World Health Organization (WHO) declared the phenomena as a Public Health Emergency of (international concern)

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in January 2020 (World Health Organization [WHO], 2020). COVID-19, also known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a major outbreak after SARS-CoV-1, which spread in the year 2002. As of 18th April 2020, about 1.5 million people have been confirmed to be affected by COVID-19 and more than 1,00,000 are dead due to this global outbreak. As an optimal solution, WHO has advised a quarantine policy to limit the spread of the virus, and now more than one-third of the global population is under some form of isolation (Kaplan et al., 2020).

COVID-19 outbreak has changed the current living arrangement via social isolation, fear of human-to-human transmission, and closure of educational as well as business institutes. This situation could very well lead to severe psychological impacts on societies (Fardin, 2020), which is well evident as the consequences of previous outbreaks such as the recent Ebola (Van Bortel et al., 2016) and Middle East respiratory syndrome coronavirus (MERS-CoV) (Al-Rabiaah et al., 2020). The outbreak of Ebola in Guinea, Liberia, and Sierra Leone adversely affected the quality of life and led to social, psychological, and economic breakdown (Van Bortel et al., 2016). Fear and anxiety in the patients of COVID-19 have already been observed (Xu et al., 2020). Belief in governments during the flu pandemic has been found significantly associated with gender, whereas income, age, education, and people living in urban and rural areas were found to have no effect on belief in the government that they will do actions to benefit the community. Gender, education, and income were found to be correlates of belief in the family (Paek et al., 2008). Life satisfaction during COVID-19 was also tested during pandemic (Satici et al., 2020; Zacher and Rudolph, 2020). Another study investigated that age, income, and gender are significant correlates of life satisfaction during COVID-19 in Germany. However, the effect of education on life satisfaction during COVID-19 pandemic was found insignificant (Zacher and Rudolph, 2020). Similarly, the existing literature in the field of epidemiology has well recognized the impact of diseases on the behavior and psychology of individuals (Cherif et al., 2016; Pellmar et al., 2020).

Humans, known as social animals, living in social clusters might suffer not only from COVID-19 itself but through the isolation as well. Theorists define the perceived social isolation as physical separation from others and tested this phenomenon for having any psychological consequences. They found that social isolation can result in negative emotions (e.g., anger, sadness, and low mood), decreased levels of arousal in extroverts, and those who prefer to stay around individuals and even decline in cognitive abilities (e.g., problem solving and decision making; Cacioppo and Hawkey, 2009). Consequently, overwhelming feelings of isolation or the feeling of loss of social relations have been shown to have implications for the decline in trust in relations and belief, alongside a buildup of worsening immune functioning, disruptions in sleep, and laziness, which lead to weight gain and stress (Cacioppo et al., 2002). These theories have also been used with regard to studying how social disconnection can lead to the emergence of stress, fear, suicidal ideation, and risks of early mortality (Holt-Lunstad et al., 2010). Therefore, the need to have social connection is a core human characteristic

and, if violated, can bring many consequences including mood swings, stress, fear, and decline in belief and trust on family or other relations. Human beings cannot remain isolated for longer periods, as it results in the development of fear, stress, distrust, depression, and associated negative feelings. The outbreaks are known for disturbing societal psychology (Van Bortel et al., 2016; Lee et al., 2018; Al-Rabiaah et al., 2020; Fardin, 2020). Wang et al. (2020) evaluated the psychological responses to analyze the impact of COVID-19 on psychology. However, the evidence on the psychological impacts of COVID-19 and the consequent social-distancing-induced isolation is scarce, as it has roughly been 4 months since the pandemic started around December in China. The need for studying the psychological outcome of COVID-19 is pivotal particularly in low-income countries where the Happiness Index is substantially low and people are struggling to improve their living standards (United Nations, 2020). This study will evaluate the psychological impacts (positive/negative) of COVID-19 that can eventually help in making corrective decisions and resource allocation to support societal life satisfaction taking the public perception into account.

In connection to this, we assess the psychological influences of COVID-19-induced lockdown, if any, from different perspectives in Pakistan, a developing country in Asia. Pakistan is geographically located between two epicenters of the COVID-19 outbreak—China and Iran (Saqlain et al., 2020)—making it suitable to study the psychological impacts of this current outbreak. This study is an initial effort to document the varied psychological effects in connection to COVID-19-related social-distancing and lockdown situation. As of April 18th, 2020, Pakistan has 7,516 confirmed cases of COVID-19, and the country is practicing a lockdown situation from the last 4 weeks including the closure of public/private business centers and educational institutions along with a very limited market activity. Pakistan first took measures on February 28, 2020 by closing the borders with Iran followed by China suspecting departure of affected people. Schools were closed nationwide on March 1st, 2020. After 2 months of complete lockdown, the country shifted to a partial lockdown.

The main aim of this study is to stimulate theoretical perspectives and novel investigations on how the COVID-19-induced quarantine is psychologically affecting the public. To do so, we first identify the presence of stress and fear in the respondents due to COVID-19 and then evaluate different associated factors such as the belief of individuals in major stakeholders such as family, government, media, and religious clerics toward COVID-19 response and the education of respondents and their parents. The COVID-19 pandemic did not only spread disease but was also supplemented with the lockdown as well. As the observed lockdown is first of its nature in the current century and the disease is novel, it is important to analyze the psychological effects on people. The study is novel due to nature of the problem and is one of the initial attempts, particularly in Pakistan. The study has analyzed different demographic and sociological factors affecting stress, trust, and belief of people during the lockdown. The fear of job loss and life satisfaction was also analyzed during lockdown. The findings from this study would progressively

further the understanding regarding the psychological impacts of such pandemics providing policy-related implications, which can ensure effective public health-relevant management. Hence, this study has not only practical implications for current times but will also advance the theory for further research.

## MATERIALS AND METHODS

The overall workflow of the study consists of five main steps: questionnaire design → pilot survey → revising the questionnaire for the nature of questions and clarity → final survey → impact analysis. To begin with, previous surveys are comprehensively reviewed (Leung et al., 2003; Leung et al., 2009; Rubin et al., 2010; Wang et al., 2020), and the most relevant questions are selected to design the final questionnaire. Questions on demographic, socioeconomic, and psychological aspects during the COVID-19 outbreak are the key constituents of the questionnaire. For example, respondents are asked about their gender, age, education, occupation, living arrangement, household size, and the education of their parents. Additionally, we emphasize asking about fear, stress, mood swings, laziness, belief, and trust in different associated actors (i.e., government, family, and media). The variables are operationally defined and asked particularly in the context of COVID-19-induced lockdown. The variable of “fear” includes fear of losing job due to lockdown, fear of being diagnosed with COVID-19, and fear that a family member will be diagnosed with COVID-19 leading to some social stigmatization. In order to assess the “belief” in social and government institutions, respondents are asked how well they believe that their family, government (i.e., federal, provincial, and local), medical services providers, and religious clerics responded to COVID-19 pandemic. It is noted that the questions are asked for each category separately. The “trust” variable is measured by how well the respondent trusts the organizations in the context of COVID-19 pandemic response. The Likert scale is used to measure the fear, belief, trust, stress, mood swings, and laziness as a consequence of COVID-19-induced lockdown. Belief was measured on Likert scale of 5 ranging from “poor” to “very good.” The five-category Likert scale of life satisfaction ranges from “very unsatisfied” to “very satisfied.” We present the distribution of mood of swings in **Figure 1A**, food storage in **Figure 1B**, believe in media in **Figure 1C**, believe in religious clerics in **Figure 1D**, believe in family in **Figure 1E**, and social discrimination in **Figure 1F**. Stress was measured using the 4-point Likert scale ranging from “not at all” to “often” based on the Depression Anxiety Stress Scale (DASS) (Lovibond and Lovibond, 1995).

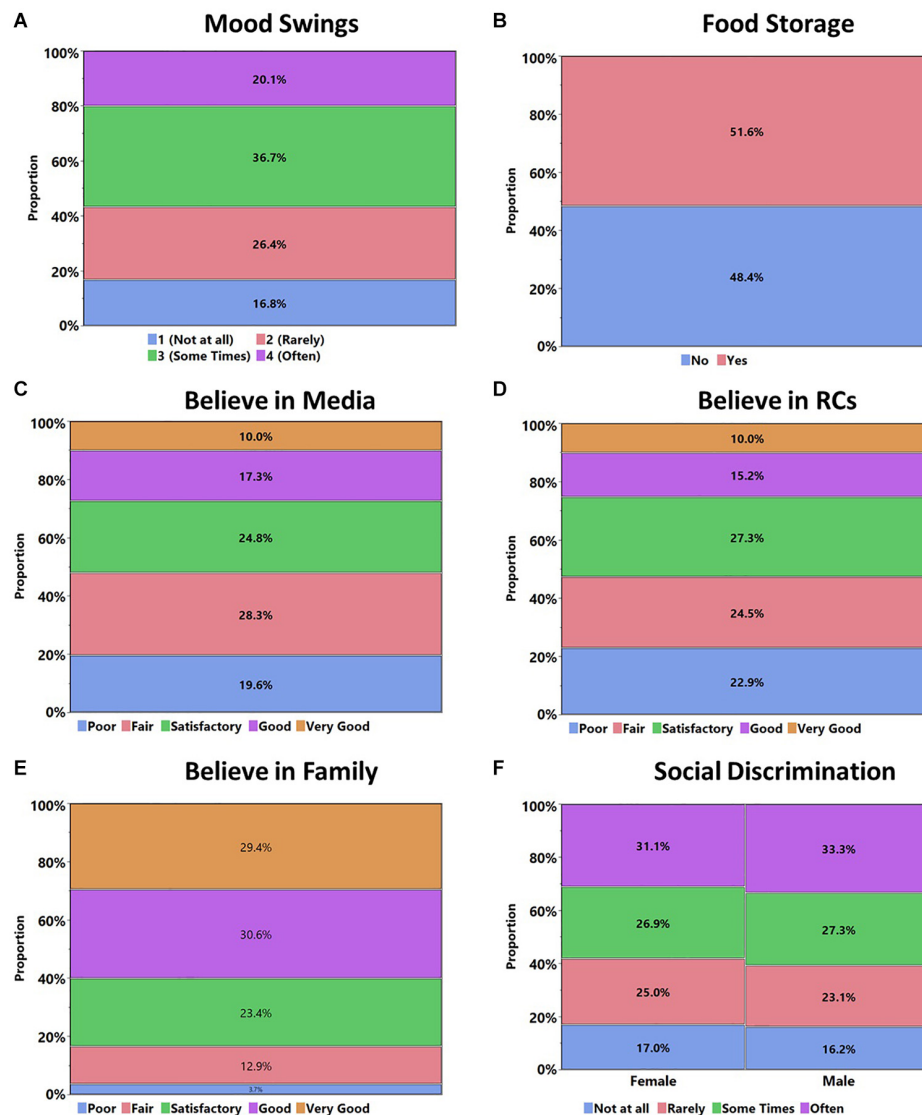
Similar to many other countries, the government of Pakistan has restricted gatherings, and staying at home is advised to reduce the human interactions during this pandemic. The country is experiencing a lockdown situation from the last 4 weeks. Therefore, the respondents are also asked whether they have stored food due to lockdown or not. In addition, respondents are asked whether they think the relief package of PKR 12,000 by the federal government is sufficient or not. It is noted that the responses to these questions are dichotomous.

We use the questionnaire-based cross-sectional survey across Pakistan to evaluate the psychological response during this pandemic of COVID-19, if any. Assuring the safety of respondents and keeping the paradigm in mind, the best possible way in this current situation is the online surveying approach to collect the data (Wang et al., 2020). Using a snowball sampling strategy, an anonymous online questionnaire is floated among individuals. It is initially floated among the residents of Islamabad Capital Territory (ICT), Pakistan, including working professionals and students. They were further encouraged to pass it on to others. In addition to this, we approach people residing in all the provinces in Pakistan, electronically, and ask them to float the questionnaire further so that we can cover a wider area. The data are collected during the last week of March and first week of April 2020, and we receive 560 responses in total. After data cleaning for incomplete responses and randomly selecting a balanced mix of male and female respondents, we are left with 428 responses, which are used in further analysis. Simple random sample may lead to a sample that does not truly reflect the population makeup. The sample may over- or underrepresent a demographic such as gender. Stratified techniques are used to overcome this problem. According to this technique, pools according to categories are formed from which the subsample is randomly selected to better represent the population (Pérez Salamero González et al., 2016). It is important to note that our sample of 428 observations is enough for generalization with a 5% margin of error at 95% confidence as per the sample size calculation criteria discussed in Krejcie and Morgan (1970). Hence, we are confident to say that the survey data are stable, and it is appropriate to use the data for further analyses procedures (DeVellis, 1991; Wu et al., 2020).

To analyze the association between different COVID-19-related outcomes (i.e., stress, trust, belief, fear of job loss, and life satisfaction) with potential explanatory factors (**Table 1**), we use the multivariate logistic regression because the dependent variables in our analysis are categorical. The general equation is as follows:

$$\theta(Y = k|X = x_{mi}) = \text{logit}\delta(x) = \ln \left[ \frac{\delta(x)}{1 - \delta(x)} \right] = \beta_{0k} + \beta_{1k}x_{1i} + \beta_{2k}x_{2i} + \beta_{3k}x_{3i} + \dots + \beta_{nk}x_{ni}$$

where “Y” is a vector for dependant variable having k outcomes, and “X” is a vector for independent variables. The number of observations is given by “i,” and “m” denotes the number of independent variables. The detail on independent and dependent variables is provided in **Table 1**. We have only reported significant variables in the results from the models, whereas, for the rest of the variables in the model, please refer to **Table 1**. The Benjamini–Hochberg procedure (Thissen et al., 2002) has been used to get the adjusted *p*-values to reduce the chance of false positive results (type 1 error). The omitted variable test has also been used to check the omitted variable bias and model misspecification following Papke and Wooldridge (1996). The insignificant *p*-value shows that the model is correctly specified. In addition, while using the logistic regression, the test of parallel line assumptions has also been carried out. The significant test



**FIGURE 1 |** Frequency distribution of key indicators of respondents.

shows that the assumption of parallel lines for the usage of ordinal analysis has been violated. In addition, the model fit has further been carried out. In this study, we use JMP Pro. Software, a comprehensive suite of computer programs for statistical analysis from the SAS Institute, United States of America<sup>1</sup>.

## RESULTS

Pakistan has a relatively young population, which is also reflected from the responses as the mean age of the respondents is 25 years ranging between 18 and 55 years. The descriptive analysis shows that around 77% of the respondents are single and the rest are married. In the context of the working population, we observe

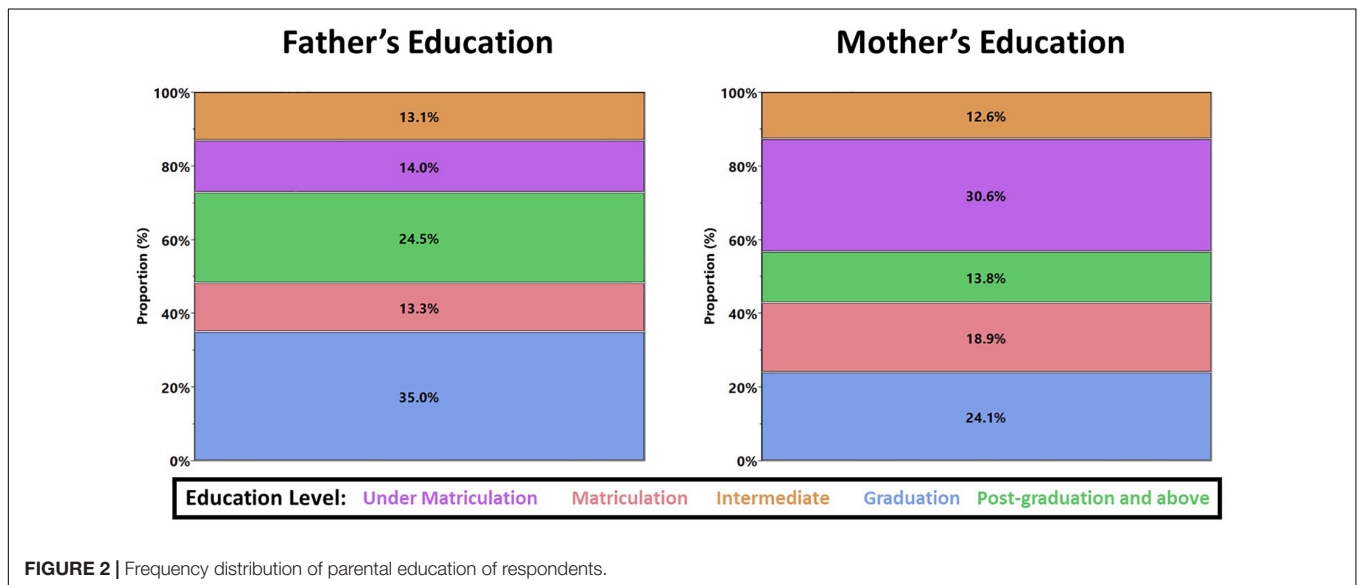
that 32% of the respondents are currently working and 48% hold a graduation degree in the sample ( $n = 428$ ). The overall respondents are widespread across the country belonging to 50 distinct districts. Most of the respondents (89.5%) are living with family, which might be due to strong family bonding and the concept of social insurance in Pakistan. Besides, we observe that ~55% of respondents are having a household size of three to six people, and ~35% of respondents have more than six people, reflecting a relatively higher household size in Pakistan. In general, the education of respondents' fathers is higher than their mothers (**Figure 2**). For example, the proportion of "undermatriculation"—the lowest level of education in the survey—for mothers is ~31% as compared to 14% for fathers. Similarly, the proportion of "postgraduation and above" for fathers is higher than that for mothers (~25 and ~14%, respectively). Therefore, it becomes interesting to

<sup>1</sup>www.sas.com



**TABLE 1** | Detail on the dependent and independent variables used in this study to set different logistic models.

Dependent variables → independent variables ↓	Stress due to lockdown	Belief in family's response	Belief in media's response	Belief in religious clerics' response	Fear of losing job	Life satisfaction
Gender	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	X
Marital status	✓	✓	✓	✓	✓	X
Household size	✓	✓	✓	✓	✓	X
Profession	✓	✓	✓	✓	X	X
Living arrangement	✓	✓	✓	✓	✓	X
Trust in provincial gov	X	X	X	X	X	✓
Trust in family	✓	X	X	X	X	✓
Relief package	X	X	X	X	X	✓
Mood swings	✓	X	X	X	X	X
Fear of losing job	✓	X	X	X	X	✓
Life satisfaction	✓	X	X	X	X	X
Food storage	X	X	X	X	X	✓
Respondent's education	✓	✓	✓	✓	✓	X
Mother's education	✓	✓	✓	✓	✓	X
Father's education	✓	✓	✓	✓	✓	X



**FIGURE 2** | Frequency distribution of parental education of respondents.

explore the role of parents' education in developing stress-related outcomes, especially when people are spending a lot of time with their families under the lockdown situation. From the life satisfaction perspective, it is even more compelling to document the role of parental education in "overall life satisfaction." In short, we compile a diverse group of respondents of different ages, living in distinct areas, with different household size, and having different family backgrounds.

### Socioeconomic Factors

It is observed that ~51% of the respondents have stored food during this lockdown (Figure 1B). Most of those respondents have a family size of four to six people (56%) and more than six household sizes (45%). This seems legitimate that respondents with larger household sizes tend to store food during emergencies such as COVID-19, as the duration of the current lockdown is not clear at the moment. More than 50% of the respondents said that quarantine, staying at home, and social distancing

have affected their lives to some extent. In addition, ~70% think that working from home has not increased their workload. Respondents are also asked which challenge Pakistan is facing currently. Around 61% of respondents think that COVID-19 is the biggest challenge right now. On the other hand, 32% consider the economic crisis as the biggest challenge. Respondents were also asked about the existence of pandemic response policy. Around 37% of people think that Pakistan has a pandemic response policy, which, in fact, does not exist. This represents a false public perception toward government measures to deal with current and future pandemics such as COVID-19, which could potentially lead to ineffective/non-serious precautions to tackle the pandemics. Among those who think that Pakistan has a pandemic response policy, ~50% are graduates. The proportion of the respondents who think the response policy exists is larger for female (41%) than for male respondents (33%). Similarly, a reasonable proportion of the respondents (~32%) think that if they tested positive for COVID-19, they will face social

discrimination often. Among these respondents, the proportion of male is slightly larger than the female respondents, ~33% as compared to ~31%, respectively (Figure 1F). A major reason behind this larger male proportion might be that men in Pakistan have more leverage to go outside as compared to women.

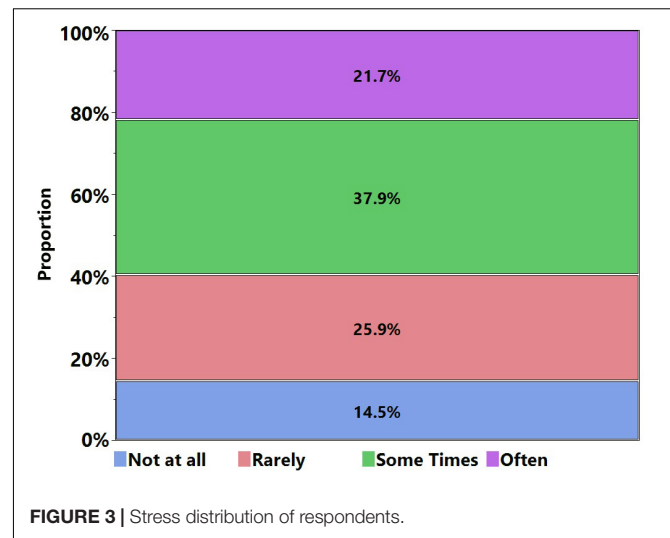
## COVID-19-Related Stress

Stress is the most evident outcome of any outbreak (Al-Rabiaah et al., 2020; Wang et al., 2020). Stylized facts from this study reveal that approximately 38% of the respondents are stressed “sometimes,” and 22% of them are stressed “often” in the context of lockdown related to COVID-19 (Figure 3). As mentioned earlier, Pakistan is under lockdown situation from the last 4 weeks with a clear government advisory to stay at home and avoid all sorts of gatherings. In this regard, we evaluate the association of stress with the age of the respondent, parental education, household size, and mood swings. The results show that stress is being affected by age, parent’s education, and mood swings due to the lockdown (Table 2). It is noted that the results are only presented for the statistically significant factors at a 95% confidence level. If the respondent is not having mood swings at all, he/she has a higher probability that he/she might not experience stress at all. Therefore, a demonstration of mood swings might have become a source of elaboration of stress, and similarly, having mood swings “often” increases the odds of experiencing stress “often.” Likewise, experiencing mood swings “rarely” increases the odds of having stress “rarely.” It is evident from the results that if the mother has secondary school certification (matriculation) as compared to intermediate, then they have higher odds of having “no stress due to lockdown at all.” But if the mothers of respondents are “postgraduate or above” as compared to “intermediate,” then they have lower odds of having stress “rarely.” This situation indicates that the respondents having highly educated mothers have higher odds of having stress “often.” Highly educated mothers can sense the severity of the situation and unintentionally transfer it to children, which might result in higher stress. Furthermore, if the overall life satisfaction is “good” and “satisfactory,” the respondents have higher odds of relatively less stress (i.e., odds of having stress “rarely” and “sometimes” are higher as compared to “often” simultaneously). This result is self-explanatory that if life satisfaction is high, then the probability of having stress “often” is low.

## Belief in Response to COVID-19

### Belief in Family

Belief is measured on a scale of “poor,” “fair,” “satisfactory,” “good,” and “very good.” The results show that the respondent’s age along with parent’s education are significant factors to affect the respondents belief in response to COVID-19 outbreak by his/her family (Table 3). We further find that increasing age or elderly people have lesser odds of having “poor” belief in the family’s response to COVID-19 as compared to “very good.” If the respondent’s fathers have “postgraduation or above” education as compared to intermediate, they have lower odds of having “fair” belief in the family as compared to “very good.” On the contrary, if mothers have “postgraduation or above” education as compared to intermediate, they have



lower odds of having “satisfactory” belief in the family as compared to “very good.” In short, the respondents with highly educated parents have a strong belief that their family has responded well to COVID-19 outbreak. Conclusively, elderly people and respondents whose parents have “postgraduation or above” have a higher belief in the family’s response to COVID-19.

### Belief in Media

The odds of female respondents are lower for having “poor” belief as compared to “very good.” It implies that female respondents have a higher belief in the media’s response as compared to male respondents (Table 4). This brings an interesting insight regarding the female individual’s reliability over media for the response to COVID-19. Thereafter, we document that elderly people also have lower belief in the media’s “poor” response in the context of COVID-19 as compared to “very good.” This implies that they are satisfied with the media’s reporting and role in making people aware of COVID-19 situations, or in other words, they believe that media somehow fulfilled their responsibility toward COVID-19 communication. If the mother’s education is “under matriculation” (secondary school certification), the odds are higher for having “poor” belief in media. The same trend follows for “fair” belief. Whereas, if the mother’s education is “postgraduation or above” as compared to “intermediate,” then the odds of having “fair” belief as compared to “good” are lower. The respondents having highly educated mothers have a higher probability of having a “very good” belief in the media’s response to this current pandemic. Therefore, we observe the acceptance of media with higher attainment of mothers’ education. Additionally, the media’s role is questionable as well; one can argue the inability of media to form a better opinion among the mothers with lower educational attainment.

### Belief in Religious Clerics

Our results show that as one grows older, the odds increase for having “fair” and “satisfactory” belief in religious clerics as compared to odds of “very good” (Table 5). Similarly, the

**TABLE 2 |** Multilogistic-regression-based results for stress.

Dependent variables	Independent variables	Odds ratio (Std. Errors)	p-value	Adjusted p-value	Chi square
<b>Stress due to COVID-19-related lockdown (base category “often”)</b>					
<b>Stress due to lockdown (not at all)</b>					
	Mother’s education matriculation	3.001 (0.412)	0.007*	0.030	7.12
	Mother’s education postgraduate or above	0.212 (0.601)	0.010*	0.030	6.61
	Mood swings not at all	4.314 (0.376)	0.0001*	0.010	15.05
<b>Stress due to lockdown (rarely)</b>					
	Mother’s education postgraduate or above	0.413 (0.420)	0.035*	0.042	4.42
	Mood swings rarely	1.944 (0.292)	0.022*	0.037	5.18
	Life satisfaction level good	1.879 (0.311)	0.042*	0.042	4.12
<b>Stress due to lockdown (sometimes)</b>					
	Age	1.089 (0.041)	0.040*	0.042	4.20
	Father’s education matriculation	0.408 (0.368)	0.015*	0.030	5.89
	Working status (students)	1.883 (0.284)	0.026*	0.037	4.95
	Life satisfaction level satisfactory	1.885 (0.257)	0.013*	0.030	6.08
Unadjusted R <sup>2</sup>			0.164		
<b>Effect likelihood ratio tests</b>					
Independent variables			Prob. > chi-square		
Mood swings			< 0.0001*		
Life satisfaction			0.013*		
Education			0.010*		
<b>Whole model test</b>					
Difference (–loglikelihood)			< 0.0001*		
<b>Omitted variable test</b>					
Model			0.7328		
<b>Test of parallel lines</b>					
Difference (–2loglikelihood)			< 0.0001*		

\*p < 0.05.

**TABLE 3 |** Multilogistic-regression-based results for belief in family’s response to COVID-19.

Dependent variables	Independent variables	Odds ratio (Std. Errors)	p-value	Adjusted p-value	Chi square
<b>Belief in family’s response to COVID-19 (base category “very good”)</b>					
<b>Family’s response (Poor)</b>					
	Age	0.762 (0.136)	0.046*	0.046	3.970
<b>Family’s response (fair)</b>					
	Father’s education Post Graduate or Above	0.242 (0.540)	0.008*	0.028	6.870
<b>Family’s response (satisfactory)</b>					
	Mother’s education Post Graduate or above	0.339 (0.441)	0.014*	0.028	6.000
	Mother’s education matriculation	1.900 (0.308)	0.037*	0.046	4.340
Unadjusted R <sup>2</sup>			0.133		
<b>Effect likelihood ratio tests</b>					
Independent Variables			Prob. > Chi square		
Marital status			0.044*		
Household Size			0.002*		
Mother’s education			0.003*		
<b>Whole model test</b>					
Difference (–loglikelihood)			< 0.0001*		
<b>Omitted variable test</b>					
Model			0.1033		
<b>Test of parallel lines</b>					
Difference (–2loglikelihood)			< 0.0010*		

\*p < 0.05.

respondents whose mother’s education is “postgraduation or above” have higher odds of having “fair” and “good” belief than “very good.” Thus, the belief in religious clerics for their response to the pandemic is significantly influenced by the age of the respondents and their mother’s education (95%

confidence). Respondents having highly educated mothers and elderly have lesser belief in religious clerics. This is interesting to observe that the odds of having higher belief in religious clerics are linked with mother’s education instead of that with the father in Pakistan. This is due to the fact that mothers

usually spend more time with the family, and educated mothers are more likely to educate their children at an early age about religion and importance of different stakeholders. On the other hand, majority of the fathers remain engaged in the labor market or daily life routines out of their homes. Therefore, they usually have less time to spend with the family to discuss the importance or the role of religious clerics during such pandemics. In the past, Pakistan has experienced SARS,

MERS, H1N1 flu, and dengue (Khan et al., 2008; Hakim et al., 2011; Aamir et al., 2012; Saqib et al., 2017). In the history of Pakistan, religious clerics have not been active in case of any endemic and have not played a pivotal role in spreading awareness about the outbreaks of different diseases or taking any necessary measure. This might have led to a situation where the educated group has lesser belief in religious clerics.

**TABLE 4 |** Multilogistic-regression-based results for belief in media's response to COVID-19.

Dependent variables	Independent variables	Odds ratio (Std. Errors)	p-value	Adjusted p-value	Chi square
<b>Belief in media's response to COVID-19 (base category "very good")</b>					
<b>Media's response (poor)</b>					
	Gender (female)	0.576 (0.218)	0.011*	0.020	6.350
	Age	0.902 (0.052)	0.048*	0.048	3.880
	Mother's education under matriculation	3.343 (0.482)	0.012*	0.020	6.260
<b>Media's response (fair)</b>					
	Mother's education postgraduate or above	0.348 (0.491)	0.032*	0.048	4.600
	Mother's education under matriculation	3.842 (0.465)	0.003*	0.015	8.360
Un-adjusted R-square			0.088		
<b>Effect likelihood ratio tests</b>					
Independent Variables			Prob. > Chi square		
Gender			0.014*		
<b>Whole model test</b>					
Difference (-loglikelihood)			0.0388*		
<b>Omitted variable test</b>					
Model			0.5408		
<b>Test of parallel lines</b>					
Difference (-2loglikelihood)			< 0.0001*		

\* $p < 0.05$ .

**TABLE 5 |** Multilogistic-regression-based results for belief in religious clerics' response to COVID-19.

Dependent variables	Independent variables	Odds ratio (Std. Errors)	p-value	Adjusted p-value	Chi square
<b>Belief in religious cleric's response to COVID-19 (base category "very good")</b>					
<b>Religious clerics response (fair)</b>					
	Age	1.159 (0.067)	0.026*	0.035	4.92
	Mother's education postgraduate or above	3.919 (0.689)	0.047*	0.047	3.93
<b>Religious clerics response (satisfactory)</b>					
	Age	1.166 (0.065)	0.018*	0.035	5.57
<b>Religious clerics response (good)</b>					
	Mother's education postgraduate or above	5.512 (0.707)	0.015*	0.035	5.83
Unadjusted R <sup>2</sup>			0.097		
<b>Effect likelihood ratio tests</b>					
Independent variables			Prob. > Chi square		
Gender			0.011*		
Age			0.047*		
<b>Whole model test</b>					
Difference (-loglikelihood)			0.0064*		
<b>Omitted variable test</b>					
Model			0.7306		
<b>Test of parallel lines</b>					
Difference (-2loglikelihood)			0.0370*		

\* $p < 0.05$ .

## Fear of Losing Job in Response to COVID-19

The results show that the working female respondents (81%) have no fear of losing job. Among those who are working, the respondents with higher education [i.e., graduates (38%) and postgraduates (50%)] have no fear of losing job. Since our reference category in this case is “Yes,” the respondents whose father’s education is “matriculation” as compared to “intermediate” have lower odds of “no of fear of losing job” (Table 6). In contrary, we observe that the respondents whose father’s education is “graduation” as compared to “intermediate” have higher odds of “no fear of losing job.” This signifies that the role of a father’s education cannot be undermined in terms of psychological consequences during such pandemics.

Our findings ascertained that people with lower educational attainment are more susceptible to this economic insecurity as a consequence of COVID-19 that they will be laid off, whereas we do not observe such estimates for women or people with higher educational attainment. It is noted that the model used for fear is simple logistic instead of the multivariate logistic model due to the nature of responses.

## COVID-19 and the Public Perception Toward the Life Satisfaction

Human life satisfaction is a broad concept representing how well people meet their emotional, environmental, spiritual, social, physical, and economic needs. It also includes individuals’ own judgment about their own life and society (Levy and Guttman,

**TABLE 6** | Logistic-regression-based results for fear of losing job due to COVID-19-induced lockdown/quarantine.

Dependent variables	Independent variables	Odds ratio (Std. Errors)	p-value	Adjusted p-value	Chi square
<b>Fear of losing job due to COVID-19-related lockdown (base category “yes”)</b>					
<b>Fear of losing job</b>					
	Gender (female)	1.427 (0.138)	0.010*	0.019	6.61
	Father’s education graduation	1.762 (0.242)	0.019*	0.019	5.49
	Father’s education under matriculation	0.501 (0.280)	0.013*	0.019	6.08
Unadjusted R <sup>2</sup>			0.134		
<b>Effect likelihood ratio tests</b>					
Independent variables			Prob. > Chi square		
Gender			0.009*		
Father’s education			0.020*		
<b>Whole model test</b>					
Difference (–loglikelihood)			< 0.0001*		
<b>Omitted variable test</b>					
Model			0.3688		

\* $p < 0.05$ .

**TABLE 7** | Multilogistic-regression-based results for public perception toward life satisfaction in the face of COVID-19.

Dependent variables	Independent variables	Odds ratio (Std. Errors)	p-value	Adjusted p-value	Chi square
<b>Current life satisfaction (base category “very satisfied”)</b>					
<b>Life satisfaction (not at all)</b>					
	Gender (female)	1.786 (0.276)	0.036*	0.036	4.39
	Fear of losing job (No)	0.535 (0.297)	0.035*	0.036	4.42
<b>Life satisfaction (little satisfied)</b>					
	Fear of losing job (no)	0.889 (0.204)	0.002*	0.008	8.85
<b>Life satisfaction (satisfied)</b>					
	Food storage (No)	1.437 (0.155)	0.019*	0.036	5.45
Unadjusted R <sup>2</sup>			0.074		
<b>Effects likelihood ratio tests</b>					
Independent variables			Prob. > Chi square		
Fear of losing job			0.001*		
Food storage			0.032*		
<b>Whole model test</b>					
Difference (–loglikelihood)			0.0002*		
<b>Omitted variable test</b>					
Model			0.1010		
<b>Test of parallel lines</b>					
Difference (–2loglikelihood)			0.0090*		

\* $p < 0.05$ .



1975; Levy and Sabbagh, 2008; Jowell and Eva, 2009). The results from the descriptive analysis show that around 38% of the respondents remain neutral about their life satisfaction. Around 57% of male and 43% of female respondents are satisfied with their life during this pandemic. Among those people who have responded “very satisfied” even in this pandemic, 37% have postgraduate education. Thus, the perception about the life satisfaction of female and highly educated individuals even in this pandemic seems not to be much influenced. Higher educational attainment is linked with higher premium or security for long-term success in the labor market. This might be the potential reason that a larger proportion of people with higher education is satisfied even during this emergency.

**Table 7** shows that female, as compared to male, respondents have higher odds of having “not satisfied life” in this pandemic as compared to “very satisfied life.” If people have no fear of losing job, the odds of “not at all satisfied” are lower as compared to “very satisfied.” “No fear of losing job” has lower odds of being “not at all satisfied” and “little satisfied” as compared to “very satisfied” with life. In Pakistan, the job market is not precipitating except for low-/daily wage workers. That is why having fear of losing job has not influenced the perception of individuals about life satisfaction. Additionally, the respondents have higher odds of “satisfied” as compared to “very satisfied” when they have no food storage. In Pakistan, people are hoarding food, and thus, having food storage might increase the satisfaction level and assure life sustainability.

## CONCLUSION

In connection to WHO’s considerations about the psychological impacts of COVID-19 pandemic, this study is considered an initial effort to provide a thorough evaluation of the possible impacts of COVID-19-induced lockdown on public psychology—in Pakistan. For this purpose, an online survey is conducted, with a 5% margin of error (95% confidence), and several statistical approaches are employed to analyze different factors and to establish on how people might have been psychologically affected by the current COVID-19-induced isolation. Based on the initial results presented here, it can be argued that the outbreak has posttraumatic effects on public psychology. The results show that parental education is a significant factor associated with the stress level among the respondents during this quarantine situation. Respondents of older age and having parents with higher education have a higher belief in their family during COVID-19 outbreak. People have a lesser belief in “response by religious clerics.” Highly educated people have a high probability of having no fear of losing job. Women have a higher probability of less satisfaction with their life during this pandemic. This outbreak has affected the life satisfaction of society and caused stress.

This study indicates that the role of parental education during such pandemics cannot be undermined especially the role of father’s education. Therefore, the policy-making institutions must focus on spending more on the current generations’

education to cope with such challenges in the future. This will further remove the economic insecurity in the people of Pakistan, as we document higher odds in fear of losing jobs among less-educated people. Moreover, higher education, less fear of losing jobs, and no stress will contribute positively toward the life satisfaction in the people, which is ideal not only to have a happy population but also to have highly productive labor. Lastly, Pakistan is a religious country where religious clerics are the stakeholder in every major decision making. Thus, the government must mobilize all the resources to convince religious clerics to take up the responsibility and contribute more in terms of educating people regarding such psychological consequences in the wake of pandemics such as COVID-19.

The governments need to focus on the mental health of societies, as they might get more stressed with prolonged lockdown situation, carrying minimal out-of-house activity, and having “fear of losing job” (e.g., among the less educated such as daily wagers). To cope with this situation, counselors and psychologists can also play an important role through providing their voluntary services for the life satisfaction of society during this pressing time of global emergency. The study is important in the context of psychological interventions to improve future pandemic response in a more resilient way.

The authors do acknowledge the intrinsic limitations of the current study at this point. First of all, due to the lockdown situation, we had to rely on the online surveying approach, which might have some issues (i.e., inability to reach challenging population such as elderly population and people with no educational background). However, online surveys are a robust and cost-effective means to systematically gather the data from a wider range of audiences. It not only increases the response rate but also saves time, which is a critical aspect of the current situation. A further in-person survey or mix-method approach can be used to survey the same questions once the lockdown is over to check the sensitivity of the online survey, if any. Furthermore, we do not, particularly, emphasize the socioeconomic conditions of the respondents, which could help in evaluating the correlation of outcomes to tailor necessary interventions. Lastly, although the global time period for COVID-19 is roughly 4 months, the pandemic surged in Pakistan in March 2020. This implies that the study is performed in an early outbreak situation and is only focused on Pakistan. Follow-up large-scale studies could progressively help to assess progression of psychological manifestations. However, this might have to wait until the imminent threat of COVID-19 subsides.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation, to any qualified researcher.

## ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation

and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

SR was the main author of this study, proposed this idea, developed the questionnaire, and helped in the discussion regarding estimation and write up. WH and MS have equally

contributed in discussions, estimations and write-up. All authors contributed to the article and approved the submitted version.

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# A Narrative Review of Stigma Related to Infectious Disease Outbreaks: What Can Be Learned in the Face of the Covid-19 Pandemic?

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Infectious disease pandemics are associated with social consequences and stigma that are noticeably similar in various health conditions, health systems, and cultures. Stigma impacts health-related outcomes, not only as a barrier to receiving the timely diagnosis and appropriate treatment but also as an important variable that increases mental health issues such as anxiety and depression. The COVID-19 outbreak has been associated with stigma too. Studying similarities as well as differences in the features of stigma observed in each outbreak can provide us with the knowledge and deeper understanding of the situation, which is necessary for approaching the issue comprehensively. The stigma needs to be addressed rigorously by professionals and health care providers as well as authorities. Here, we narratively review stigma due to some well-known infectious diseases and how it parallels to the current COVID-19 situation. After discussing its effects on both individuals and societies, we provide solutions to manage this important issue.

**Keywords:** corona virus disease (COVID-19), stigma & discrimination, health consequence, pandemics, mental health, public health

## INTRODUCTION

The Covid-19 pandemic is progressively known as a social problem rather than just an infectious disease. There are diseases that not only burden the medical system but also by provoking social stigma, lay an increased tension on each individual. Contagious diseases such as acquired immunodeficiency syndrome (AIDS), Ebola, some types of severe Influenza such as H1N1 and COVID-19 are among those (1–3). They seem to be mysterious due to a lack of sufficient knowledge about them and being lethal (4, 5). Nowadays, many people suffering from COVID-19 are challenged doubly, both by the disease and by the stigma associated with it.

Stigma has been defined as an identifying mark of disgrace or one defining characteristic that is related to a particular context, quality, or person. It is a deleterious label that makes the stigmatized person or group feel secluded from mainstream society (6, 7). Labeling can further develop into pigeonholing and stereotype formation, therefore leading to discrimination and status loss (8). In the case of stigma related to infectious diseases, stigmatization, blaming others, and discrimination are exacerbated by fear of illness. It is not always done consciously and might serve several means.

Firstly, in the face of an unfamiliar or intolerable adverse situation (here, lack of knowledge about the source of infection and protective measures) or an unknown hazard (insufficient scientific understanding about the infection source), stigmatization can temporarily bring feelings of security even if it is not a real or a permanent one. This is done by distancing from the source of the threat (here infected people), through dividing people into “them” and “us.” The underlying thought is: we are not them, we do not possess the same risk factors, so we are not in danger (1). Individuals may be the victims of persistent discriminatory behavior and prejudice in such situations. Secondly, attributing a familiar cause—even if it is not a real or relevant one—changes an unknown situation to a more recognized one. Finding a culprit for a disease changes a mysterious and scary disease into a more tangible and controllable one. The anger caused by the disease can be directed toward the attributed source and by reducing the feeling of responsibility for spreading the disease, it can temporarily reduce anxiety. In the case of infectious disease outbreaks, scapegoating and projecting negative emotions onto a group of people, attributing the cause of their illness to their irresponsibility or their poor morals or even their prior health conditions are some examples (1, 4, 5).

Stigma has several features. Self-stigma happens when the stigma is internalized, so it affects attitudes, emotions, and even beliefs of individuals and forms the behavior of the people who are stigmatized (9). Internalized stigma can induce the feeling of inferiority and rage turned inward (10). Stigma interferes with the process of diagnosis and treatment by disrupting social communication, individual identity, and the sense of free will (11). People who feel stigmatized are susceptible to avoiding certain behaviors that they feel might increase stigma; in the case of COVID-19 that can be getting tested, because a positive test can be the label they consider stigmatizing. Consequently, by preventing social adjustment and healthy adaptive behaviors, stigmatization can exacerbate physical health problems (10). People who have internalized stigma, are less likely to follow health guidelines provided to control infections (e.g., wearing face covering, keeping distance from others and not mixing with other households), have less tendency to undergo diagnostic tests or comply with test-and-trace systems, and even are reluctant to receive necessary treatments (11, 12). Stigma, therefore, can be a barrier to effective prevention and control mechanisms and can affect, not only the stigmatized group, but also a wide range of people, including patients, families, friends, and the whole community.

Perceived stigma is another important facet of stigma; that is, how much people expect stigma from society and even health care providers. In most infectious diseases, perceived stigma is high and is associated with health-related outcomes (13, 14). Even the decision of whether to seek help from traditional healers or the conventional health care system is related to perceived stigma (15, 16). Literature suggests that in many cultures such as Africans and Asians, stigma is associated with approaching traditional healers as a first step (16, 17). This will further complicate the situation by delaying accurate diagnosis and treatment. Perceived stigma not only discourages infected

individuals from accessing needed health care services (18) but it also affects health care professionals themselves (3, 19). In the case of COVID-19, for instance, stigma has highly influenced health care workers' performance by increasing fatigue, burnout, and decreasing satisfaction. Perceived stigma and discrimination also affect health care providers' sense of self-efficacy, and increase psychological distress and somatic symptoms (3).

Although there are arguments suggesting that the stigma related to the disease might have some evolutionary functions, that is, avoiding the source of infection, and staying safe by distancing from people who are infected with the disease (20), the costs of stigmatization almost always outweigh the hypothetical benefits (1, 10). There seems to be a delicate line separating stigmatization from necessary infection prevention measures that encourage social distancing and avoiding the source of contamination. Avoiding the source of hazard prudently can reduce the hazard but stigmatization has a component of moral judgment about an individual, a group of people, or a place (21). People and infection must not get conflated. Avoiding the source of infection and disease must clearly get distinguished from the whole character of an individual, their ethnicity, cultural, religious and socioeconomic background, and place of living; otherwise, the consequences can be serious as will be discussed below.

Stigma is a pressing issue and its consequences are noticeably similar in various health conditions, health systems, and cultures (22, 23). Here, we evaluate stigma related to some well-known infectious diseases and how it parallels to the current COVID-19 situation. Then, we review its effects on both individuals and societies and how disease-related fear and impulsive measures can be generalized and projected to irrelevant features such as ethnic background or the place of living. Consequences of stigma on public health and individuals' life as well as some solutions are provided.

## STIGMA IN PREVIOUS EPIDEMICS AND PANDEMICS

Throughout history, human beings have been exposed to dangerous diseases that have forced them to modify their behavior to adapt to new conditions. The WHO has defined a pandemic as “a worldwide spread of a new disease” (24). From the 19th century's smallpox to the 21st century's COVID-19, epidemics and pandemics have always been associated with stigma and severe social consequences (25–27). Dealing with several outbreaks delivers a wealth of knowledge on what the consequences of stigmatization are in society and how to deal with them effectively. Despite similarities, each infectious disease outbreak, such as plague, tuberculosis, syphilis, HIV, and hepatitis have represented different features of stigma that should be addressed to plan preventing or eliminating stigma measures scientifically (1, 10, 28). These differences could explain why we struggle with stigma so much, even though we have been through pandemics before.

Stigma exists in a variety of cultures and its consequences are markedly parallel in various health conditions, health systems,



and cultures (22). In almost all pandemics, minorities [whether due to ethnicity (5), sexual orientation (11), gender identity (29), or place of living (2)] are at the highest risk of stigmatization. Both fears of exposure to illness and fear of dissimilarity (here people who we think are different) result in stigma (2, 21, 30). In all outbreaks, insufficient knowledge about the prognosis and outcomes, how long it could take until a cure is found and no availability of an effective treatment option or vaccine for prevention, are the main sources of fear (26). There are, however, differences in the features of stigmatization in each pandemic that can color our understanding of stigma. These differences present important areas of investigation and can be categorized as below:

### Risk Appraisal

The difference in estimated risk and related response is related to stigma (21, 23). Even when estimated risk is low, stigmatization happens. There are, for example, several reports of Americans stigmatizing Africans and their neighborhoods during the Ebola outbreak in West Africa despite the risk to Americans being declared low (2, 21). Sending conflicting messages from media has been suggested to play a role in this (21). In the Covid-19 pandemic, the risk is high for almost all countries. This can increase fear which can result in increased stigmatization toward people who are assumed to be infected. By distortions of hazard appraisal, social stigma can lead to anxiety and panic in society and can even affect the distribution of resources by authorities (23, 31). For example, government regulated distribution of personal protective equipment (PPE) as well as its shortages gave high levels of conflict and uncertainty as hospitals were prioritized whereas people working in care homes had to work under close contact with those affected but without proper PPE available to them.

### Transmission Way

Respiratory viruses are more contagious than other well-known stigmatizing diseases and there is less control on its spreading; therefore, the social reactions can be dissimilar. Fear of a global pandemic combined with scenarios of economic breakdowns and shortages can exacerbate fear driven reactions along with stigma in these cases (5, 19, 23).

### Lethality

Lethality of a disease is one of the factors that causes stigmatization. On the other hand, most of these viruses are less lethal than some sexually transmitted diseases (STDs) such as HIV. The contagion of Covid-19 is much higher, which introduces new challenges. In the case of COVID-19, people opposing the measures to stop the rate of infection state that COVID-19 is about as lethal as the flu. However, with COVID-19 being much more contagious, death rates soar if nothing is being done.

### Difference in the Population Who Are at Risk

Prejudice and established social norms are associated with stigma (1, 4). For example, in STDs such as HIV, homosexual men have been (and continue to be although to a lesser

extent) stigmatized, which contributed to less funding on research and delaying treatment in the 1980s (1, 30). In respiratory viruses such as MERS and Covid-19, the main at-risk groups are the elderly, people with immune deficiencies, and individuals suffering from cardiopulmonary illnesses (19). These groups often face different forms of stigma that will be discussed later.

## RISK FACTORS AND VULNERABLE GROUPS

### Ethnic Background and Place of Living

Established social hierarchies and some biases in attitudes regarding ethnic minorities and immigrants predispose them to risk of stigmatization (2, 4, 5). Phenotypic features such as the color of the skin and even the accent of speech can be a source of stigmatization (2). When an association of the disease takes place with a particular ethnic background or even a place of living or origin, it might shape a metonymy that completely associates the disease with that particular group or place. For instance, in the nineteenth century, after several smallpox epidemics in Chinatown in San Francisco, the metonymy of the infection and the region took place (25). This association caused severe racialism and xenophobia during that period. During H1N1 epidemics in the US, the Mexicans and immigrants from South America were considered the main population that contributed to spreading the disease and therefore faced severe stigma (5). Currently, as COVID-19 started in Wuhan, associating it with the originating place (China) resulted in labels such as “Chinese Virus” or “Wu Flu.” One study found that there has been a prominent rise in application of the terms “Chinese virus” or “China virus” on Twitter in the USA (32). This goes strongly against the recommendations of the World Health Organization (WHO), who recommends avoiding the use of geographic locations for naming a disease as a practical way to minimize its unnecessary negative impact. Reports of people with Asian phenotype who have been victims of racist attacks on several occasions is proof of stigma and discrimination that could have been avoided (32, 33). Naming diseases such as “swine influenza” and Middle Eastern Respiratory Syndrome (MERS) has been harmful due to generating stigma and affecting societies, tourism, industries, and economics (34).

Ethnic minorities often get affected disproportionately in pandemics such as COVID-19 (35, 36). They might be at greater risk of infection due to several socioeconomic factors and inequalities in access to health care; where and in what circumstances they live, their access to good nutrition and legitimate information, their job situation that may necessitate social contact or increase potential exposure, as well as lack of paid sick leave and having hourly jobs. However, increased discrimination against them in almost every pandemic has been documented (1, 5, 25). In the US, Blacks, Asians, and minorities (BAME individuals) have been seriously affected by COVID-19 and experience a disproportionate number of deaths. Along with previously mentioned reasons, stigma, discrimination, and health disparities have been suggested to play a crucial role (36, 37).

## Double Stigma

People who have experienced stigma (whether due to a chronic health condition or other factors such as their sexual orientation or aging) are at the risk of experiencing double stigma (38, 39). In many countries, COVID-19 was first introduced as a disease that mainly affects the elderly or people with chronic health conditions. This was intended to prevent the panic that an epidemic might cause in the society but it backfired as emphasizing it on many occasions caused severe distress in the mentioned groups (11, 13). Here we see the subtle line between providing accurate and scientific information and overemphasizing that leads to misguidance and feelings of insecurity in society. Persistently opposing the “general public” to “at-risk group” carries out the message of “in-group” vs. “out-group” that contributes to stigma formation (11). Stigma makes vulnerable people more susceptible, as altering unhealthy behavior becomes even more challenging; it can also shift an extra burden toward them while directly affecting their mental health (26).

Aging has been associated with stigma and stereotypes in several cultures (40, 41). In many western countries, attitudes toward older adults are predominantly negative (42). The stigmatizing perspective is mostly related to being weak or non-productive in a society that overvalues being young, healthy, and productive (40, 42). The elderly are at risk of emotional distress by the messages they get from society. Self-Image, perceptions, and beliefs are strong moderators for age-related stigmatization and emotional consequences such as depression (43). It can even affect their social and cognitive capacity to respond to a new stressor. Evidence suggests that exacerbation of social isolation can be a consequence of overlapping previous stigma with a new one (38). In this case, previous stigma and social exclusion related to aging intersect the stigma related to COVID-19 infection. The elderly’s reactions are highly influenced by the created social atmosphere (40), which in the case of COVID-19, has caused further isolation. Also, deficiencies in health care policies for older adults, especially in terms of mental health, have been a source of stigma (40, 44). The same cycle of misleading information, lack of support, and isolation happens here in the face of the COVID-19 outbreak. On the other side, young people seem to avoid social distancing or staying at home, as a way of denying their vulnerability and being at risk (45) and as a mechanism of putting the elderly in the “them” group who are at risk, while categorizing themselves in the “us” group that is strong and not at risk.

## Quarantine and Physical Distancing

Health experts believe that currently, the most effective way to control COVID-19 is to quarantine or maintain physical distance. How to effectively exercise these measures, however, is controversial. Even applying the term “Physical distancing” or “Social distancing” seems to be controversial, as the former refers to keeping a two-meter distance “physically” apart from others while maintaining the necessary social interactions via different methods such as using social media. The latter, however, might induce a sense of social isolation in the long term (46). Although some degree of physical distancing seems to be necessary, related

isolation can lead to stigmatization and can be quite misleading. Quarantine and social isolation are often associated with poorer mental health outcomes and increased stigma (47, 48).

When, how long, to what extent, and who should be quarantined are critical questions that should be answered carefully and precisely. We mention here an extreme case of applying quarantine probably not based on scientific measures but as a measure of racial subjugation. During the plague pandemic in South Africa in 1901, evacuation of a whole ethnic group with forced arms took place without any evidence of exposure or scientific background (49). This is an example in which acting proactively against an infectious source blurred with preexisting racial disparities which resulted in an ethnically violent intervention. This is a lesson on the importance of applying careful consideration to recognizing which act is purely scientific and which one is influenced by preexisting social structures that can originate from or contribute to stigma.

## CONSEQUENCES OF STIGMA

### Fear and Social Disruption

Lessons from previous pandemics such as HIV show us that fear of being stigmatized, along with misbeliefs about the disease, can be a barrier in seeking and receiving treatment (1, 25). There is a report about patients suspected to be infected by COVID-19 escaping from a hospital in Afghanistan. “Why the individuals left the medical facility was not immediately clear, but videos on social media suggested they were at odds with the hospital over their treatment.” (36–38, 46, 50). The blaming model of stigma proposes that people use several defense mechanisms to reduce the tension and anxiety related to the stigma of the disease, which includes either mature forms such as altruism and humor or immature ones such as denial and splitting (51, 52). Although assessing all sociocultural aspects of this multifaceted phenomenon is beyond the scope of this discussion, miscommunication, fear of social stigma, and defense mechanisms such as denial are playing an overt part.

This is not the first time that fear has overridden the risk of the disease. Back in 1901, in the US, during an epidemic of smallpox, several Italian immigrants destroyed a hospital that was built in their neighborhood for isolating people with smallpox. The social reactions were diverse but many newspapers called them “mob, unfit for autonomous governance” (53). Jumping to a conclusion and inferring the cause of the reaction to the nationality, ethnic background, literacy, and other immediate factors might be easy to reduce immediate tension but, is not an efficient and organized response. Such labeling obfuscates the real reasons; that is why and how people consider some medical services, such as quarantine and physical distancing, threatening situations, and act against them. Condemning citizens and showing in the media that people are acting irresponsibly and are not capable of a rational reaction to the threat seems to be useless and can exacerbate the tension (53). One reason for people’s enactments might be that the emergency and extensiveness of the situation often hamper the effective communications of policymakers and health care professionals with general population. In these times, clarity, along with reassurance and communicating scientific

information in simple words, is crucial. Both confusion and misunderstandings, and the presentation of “false science” by sources deemed to be thrust worthy, are breeding grounds of stigma as they evoke stereotypes, discriminatory behaviors, and prejudice. On the other hand, the impact of cultural beliefs and socially accepted norms cannot be overestimated (17, 54). Some cultural or traditional perspectives are skeptical of science and modern medicine. Even an untrusting government can play a role. Interpreting complex social responses like these is not easy and goes beyond the scope of this article, but it is worth mentioning that scapegoating, labeling, and stigmatizing can further complicate the situation.

## Health Outcomes

Experiencing different levels of emotional distress is indisputable in general populations, and this is further increased in affected patients, their caretakers, their family members, as well as the medical staff (55). The health consequences of stigma, however, go far beyond these senses. Stigma worsens physical and mental health outcomes. Stigma related to HIV, for instance, is associated with depression, anxiety, emotional and mental distress, and reduced quality of life. It also decreases the rate of adherence to treatment and access to medical facilities (12, 56). The fear of getting stigmatized causes people to avoid getting diagnostic tests (10, 56) and to reduce compliance with self-isolation rules and guidelines. Lack of accurate information, fear of judgment, and being discriminated against can lead to subconscious denial, therefore preventing being tested and refusing preventive strategies and treatment. Although increasing knowledge is a crucial measure, it is not enough for behavior alteration (11).

The stigmatized population is distrustful of the health care staff or authorities and resists cooperation in the event of a social health emergency. Stigma leads to a social misunderstanding of risk and extreme fear amongst members of society; that is accompanied by the disproportionate allocation of health care resources by politicians and health professionals (23). During the COVID-19 pandemic, long periods of quarantine, fear of illness, despair, fatigue, lack of life and personal protective equipment, insufficient and inconsistent information, financial issues, loss of loved ones, and stigma have been identified as factors which have influenced each other and are related to health outcomes (5).

Health care providers, on the other hand, are at a great risk of being stigmatized (55, 57). There are reports from around the world that doctors and other health care providers have been isolated from loved ones because of anticipated risk of contamination and assaulted physically or emotionally due to fear and stigmatization (55). This makes this already tough situation even more challenging as the increased burden on medical staff's mental health may negatively affect their functioning and resilience (3).

Anticipating the stigma related to COVID-19 health outcomes is essential to planning protective measures and affects both patients and health care providers. Stigma should be addressed rigorously as it can complicate and worsen the outcome, which necessitates careful planning and considerations and postulates more in-depth studies in this area.

## WHAT NEEDS TO BE DONE?

Factors that cause stigma can be divided into three categories: predisposing (facilitators), precipitating (triggers), and perpetuating factors. Factors such as social structures and policies can increase stigma both as a predisposing and perpetuating factor, and require long-term planning. Factors such as insufficient information or contradictory messaging are precipitating factors and can be managed with immediate strategies that will be discussed here.

Predicting stigma related consequences of COVID-19 is essential in planning protective measures. Experiencing different levels of emotional distress is indisputable in general populations and is further increased in affected people. Patients' isolation and quarantine are effective measures, but they can increase stigma and severely impact on mental health and the economy. Isolation, loss of jobs, and financial burden, among other factors, can increase the risk of depression, especially in at-risk populations (47, 48, 58). Active screening and intervention, either through telephone, online communication such as video calling, or in-person, is essential in these situations.

To approach Covid-19 related stigma, one of the most important steps is to call it out. Lessons learned from HIV related stigma show that launching and supporting anti stigmatizing campaigns, adapting unifying symbols, and encouraging community activities are effective measures (1). The most famous symbol noticeable all around the world is the red ribbon, which is a symbol of HIV/AIDS awareness, care, empathy, and support. These measure also should include all people and how protective measures can adopt to the needs of people with especial needs. For instance, sunflower lanyard (hidden disabilities lanyard), prevents people who aren't able to wear face coverings from being isolated and stigmatized as not being compliant with the rules or designing lucent masks for people with hearing difficulties.

## Communication of Science

*“Despite the great discoveries and advances of science and medicine, primitive reactions to being confronted with disease continue to divide people and communities into ‘them’ and ‘us’”.*

Writes Gilmore in an article on HIV and stigma in 1994 (1). After almost 25 years, however, this is still the case. Although every literature on stigma suggests avoiding language and metaphors that polarize society, often the first reactions of authorities, hastily, is full of stigmatizing language.

The choice of language and metaphors is critical in de-stigmatizing efforts (1, 46, 59). It directs individuals and communities' reactions to obscure situations such as pandemics. Lessons learned from managing stigma in different infectious disease outbreaks suggest that military metaphors, such as fighting or combating COVID-19, can increase tension by inducing that there is an enemy in the society which everyone should fight (1, 60, 61). These metaphors even have been associated with self-willed death, such as suicidal ideations or requesting euthanasia in more chronic infections such as HIV (1).

Messaging seems to be the key. Conflicting messages from authorities, as well as misleading information from media, lead to fear and stigma (60). Pandemics provoke panic and anxiety due to their association with death and lack of certainty about the future. Encouraging empathy, altruism, and sublimation, along with focusing on human rights and respect, is essential (1). Promoting the concept that we are in this together “whether infected or affected by it” is critical to avoid polarization (1). Separating moral judgments and blame from physical avoidance and replacing it with empathy and care, as well as providing hope and an outlook to a brighter future, seems essential (21).

Although social media can be one of the most important sources of communication to eliminate feeling of loneliness and isolation during quarantine and periods of physical distancing, the downsides should be addressed carefully and step by step. Sending information through the influx of short and often non-transparent or even contradictory messages plays a role in increasing the anxiety, fear, and stigma felt in society. The sharing of inaccurate, nonscientific, and misleading information leads to further confusion and chaos. Therefore, proper training about using these networks and how to identify the source of messages, as well as increasing people’s ability to distinguish between legitimate vs. nonsense messages, is recommended. These efforts can be done through school programs, health communities, as well as online public education, which requires both immediate and long-term interventions. Modifying misinformation and revising some mottos- especially the ones with military language that induce the sense of fighting response toward a foreign enemy- is necessary (46, 60, 61). Clarity of information and guidelines is the key to avoid confusion, fear, and the proceeding stigma. Measures like hotline services for counseling and public education can reduce the harmful mental health consequences of pandemics as is the case with COVID-19 (62) and are also helpful in reducing stigma.

Designing and implementing strategies is important, but constant evaluation of strategies and feedback is also crucial. Health care providers must actively reach out to people in society. While telemedicine is currently used extensively in the face of COVID-19, tele-follow up strategies should be considered too, while many people might be unable to be reached in person (58, 63). This necessitates both immediate and long-term planning, depending on the current infrastructures of each country.

Supporting structures and empowering people to take necessary measures by their own choice, focusing on altruism and responsibility, and building social trust is useful (47). In pandemics such as SARS and HIV, personal resources have been associated with decreased stigmatization as they positively affect rational risk estimation and rational response (30). Empathy and validating the experiences of the patients and their families through psychoeducation is important. For instance, generalizing and normalizing the grief experience as a common and accepted reaction to distress, and training management strategies such as talking and active listening are recommended. People should not be ashamed of talking about their personal experiences. Being supportive, understanding, and informative instead of blaming

is helpful. Blaming and scapegoating people can cause prejudice and unnecessary guilt feelings, which increase stigma and non-compliance with public health directives (26).

A multidisciplinary workforce is essential. It is recommended that mental health assessment and treatment strategies get integrated into essential care needed for COVID-19 infected patients, their caregivers, and close relatives both in the hospital setting and community (19, 62). This should be addressed both by local treatment centers and policymakers to facilitate this integration by planning beneficial strategies of screening, diagnosing, referring, and treating psychiatric comorbidities (27). Currently, mental health providers have encountered an overwhelming challenge due to insufficient resources, lack of appropriate guidelines, and insufficient training in dealing with mental health consequences in the new situations due to COVID-19 (62). Guidelines and protocols of stigma reduction in health facilities and community centers are necessary. One of these guidelines has been provided by the WHO for public information and can be accessed through its website (57–64). Insights on the potential existence of double stigma and addressing it concurrently are vital.

In the global scope, pandemics have to be approached through international cooperation, which should replace localized and isolated strategies and mutual blaming. Empowering international organizations and improving collaborations are necessary measures (65). In the national scope, improving public confidence in health authorities can reduce stigma (23). This necessitates long-term planning and hard work to improve health care infrastructures accessible to every level of society. With the close collaboration of governments, health care providers, media, and communities to increase empathy and care and address misbeliefs and misinformation with accurately chosen terms and metaphors, the stigma related to COVID-19 will become manageable.

## CONCLUSION

Stigma is a barrier to medical evaluation, communication, delivering and receiving necessary care due to fear and is associated with both physical and mental health complications. COVID-19 related stigma needs to be addressed rigorously by professionals and health care providers as well as authorities. Gathering more specific information on its different facets seems urgent. Lessons learned from previous pandemics show that multidimensional approaches for health care, considering all bio-psycho-socio aspects and employing strategies to enhance communities’ empathy and resilience, pave the way toward the goal of reducing stigma. Clarity of information and guidelines, as well as continuous screening of speech pitfalls and inappropriate metaphors, is suggested. This in turn will lead to a stronger sense of unity, more effective scientific communication, increased compliance with rules and guidelines set out to battle the pandemic, more efficient use of medical pathways and eventually a better management of the pandemic as a whole.



## AUTHOR CONTRIBUTIONS

FS, RM, SZM, FB, RA, and SBM had considerable contributions to acquisition and interpretation of documents and drafting the manuscript. SBM and RR had substantial contribution

to the conception and revising the manuscript critically. All the authors have approved the submitted version and agreed to be accountable for all aspects of the work. All authors contributed to the article and approved the submitted version.

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# Call for Action to Address Equity and Justice Divide During COVID-19

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The coronavirus 2019 disease (COVID-19) is deepening the inequity and injustice among the vulnerable communities. The current study aims to present an overview of the impact of COVID-19 on equity and social justice with a focus on vulnerable communities. Vulnerable communities include, but not limited to, healthcare workers, those from lower socioeconomic backgrounds, ethnic or minority groups, immigrants or refugees, justice-involved populations, and people suffering from chronic diseases or mental illness. The implications of COVID-19 on these communities and systemic disparities beyond the current pandemic are also discussed. People from vulnerable communities' experience disproportionately adverse impacts of COVID-19. COVID-19 has exacerbated systemic disparities and its long-term negative impact on these populations foretell an impending crisis that could prevail beyond the COVID-19 era. It is onerous that systemic issues be addressed and efforts to build inclusive and sustainable societies be pursued to ensure the provision of universal healthcare and justice for all. Without these reinforcements, we would not only compromise the vulnerable communities but also severely limit our preparedness and response to a future pandemic.

**Keywords:** social determinants of health, COVID-19, vulnerable communities, mental health, health policy, health equity, social medicine, social justice

## INTRODUCTION

Outbreaks such as the coronavirus 2019 (COVID-19) challenge our existing health and justice systems (1–5). The health systems around the world have been repurposed to contain and mitigate the COVID-19 infection rate and provide acute care to COVID-19 patients requiring hospitalization (6). Furthermore, due to quarantine measures physical access to health and justice systems have been limited for those with ongoing and emergent needs. These systems have been forced to adapt and reconfigure (7, 8), with disproportionate implications on vulnerable populations (3, 9). For example, COVID-19 accelerated rapid adoption and expansion of telemedicine (10), and repurposing of existing clinical wards to provide COVID-19 clinical service (8, 11). In these unprecedented times, issues related to equity and justice must be considered (12, 13). Lack of these considerations will put those from vulnerable communities at harm (14). The

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health, psychological, social and economic dimensions of an individual determine the opportunity, or the lack of it, to health and justice and the underpinning principles of equity, fairness and inclusiveness. Ensuring that the various risks to the vulnerable populations are identified early and appropriate measures are taken to prevent their impact. This article sought to present an overview of the impact of COVID-19 on vulnerable populations with regards to the issues of health equity and justice. We also provide targeted recommendations and call for a concerted action to address acute and system disparities in health equity and justice.

## METHODS

A scoping review on PubMed/Medline, media sources and official government websites were performed using the keywords “Equity,” “Justice,” and “COVID-19” until April 18, 2020, at the time of writing this manuscript. A Population, Intervention, Comparison, and Outcomes (PICO) search strategy was used (15), with the general population and healthcare workers as the study population, COVID-19 as the intervention, status of health equity and justice before COVID-19 as the comparison arm and impact of COVID-19 on equity and justice in the study population as the outcomes. Some recent publications were considered during the revision of the manuscript during October 2020 following a rather long review. The impact of COVID-19 on vulnerable populations including healthcare workers, people from lower socioeconomic backgrounds, ethnic or minority groups, immigrants or refugees, justice-involved populations, and people suffering from chronic diseases or mental illness were studied. Appropriate references relevant to COVID-19 vis a vis equity and justice issues were included in the final synthesis. Besides, we also provide targeted recommendations to address acute and systemic inequity and injustice issues during and beyond COVID-19.

## RESULTS

### Impact of COVID-19 on Healthcare Workers

Healthcare workers are disproportionately at higher risk in COVID-19 in comparison with the general community (16, 17). Extended exposure to large numbers of infected patients places them at direct risk of contracting the infection. This is exacerbated by the lack of personal protective equipment (PPE), which has been a subject of major concern across the world (18, 19). Reports of an increasing number of healthcare worker deaths due to COVID-19 have created a sense of fear and outrage (20–22). Workers have also reported anxiety about transmitting the infection to their families, elderly parents and young children (23, 24). There is a critical need for increased efforts to provide adequate PPE (18).

Healthcare workers are also suffering an immense psychological strain (22, 25–27), having to make difficult triage decisions and witnessing the loss of several patients and colleagues (28). Moreover, workers with young children are

likely to be dramatically impacted by school closures (23). To protect this population from extreme physical and mental exhaustion, governments must recognize their need for rest, and should also consider practical measures to provide support, such as the provision of food and care for young children. Targeted resources should be made available to enhance the mental health of healthcare workers. Healthcare workers, like the general population, also carry the burden of certain chronic conditions, which may put them at increased risk of COVID-19 infection (29). Considerations on age, underlying comorbidities and mental health of healthcare workers must be taken while rostering for frontline COVID-19 related care or repurposing (30, 31). Many healthcare workers may have to quarantine themselves to limit the risks to their families. It is also disheartening to note the stories of stigmatization of healthcare professionals in some parts of the world by refusing accommodation and targeting health care workers due to lack of concern and understanding.

There have been reports on disproportionately high rates of COVID-19 related death in medics from black and minority ethnic (BAME) backgrounds in the United Kingdom (UK) (32–34) and this has resurfaced the ongoing debate in the UK that those from BAME backgrounds are often not given adequate support from their peers and often struggle to be treated equally by peers (33, 35, 36). In addition to bullying and systemic racism (37), concerns about disproportionate representation in the senior management and decision-making teams or boards have also been reported by the BAME healthcare workers (38). The medical and public health administration must ensure that all clinicians, especially those from minority ethnic backgrounds, are provided adequate sponsorship and support including peer mentorship (39). Furthermore, COVID-19 has also impacted traditional medical education and training (40). Use of technologies in delivering medical education remotely could minimize the impact on medical students and medical education, alike.

### Impact of COVID-19 on Lower Socioeconomic Communities

Data shows that low socioeconomic communities are bearing a disproportionately higher brunt of the pandemic (41–45). These groups face a greater risk of detrimental financial and health outcomes during the crisis. Low-income workers in industries such as retail, transport and labor are unable to work from home and thus risk losing their source of income should they discontinue their on-site work to protect themselves and their families from COVID-19 exposure (46). Such interruptions in income can disrupt food security for families, and also limit their ability to afford treatment of existing health conditions. People working in essential sectors (e.g., transport, postal services), however, face an increased risk of contracting COVID-19 infection as they must continue working. Along with the increased risk of infection, they may also have greater difficulty in following evidence-based guidance like social distancing, accessing COVID-19 testing and care facilities. We implore governments and essential sector

organizations to provide financial support, a safe working environment to support the safe functioning of essential services during the pandemic. The government should consider looking at employment opportunities to enable lower socioeconomic groups to continue their livelihood. Moreover, there should be an increase in the access to and provision of free testing to people from low socioeconomic backgrounds, and deployment of mobile screening and infectious disease monitoring facilities in these communities.

Low socioeconomic groups are also at greater health risks due to unfavorable living conditions. Homeless people, or those living in overcrowded housing, are unable to adhere to social distancing guidelines and often lack access to personal hygiene facilities (47). Given the increase in the incidents of domestic violence, it is unsafe for them to adhere to lockdown laws and stay at home (48). We recommend the provision of temporary accommodation for people facing financial distress, homelessness, overcrowding or domestic abuse. Governments should also ensure essential supplies of electricity, water and sanitation be maintained. Furthermore, adequate access to the internet and technology should be provided to enable the continuity of education to children from lower socioeconomic households. Girls and women are more likely to be disproportionately impacted due to the closure of schools (49, 50). Increase in sexual exploitation, pregnancy and forced marriage due to closure of schools and a prolonged period of home quarantine would lead to higher drop-out rates among teenage girls (50). Furthermore, a disproportionate increase in unpaid household work burden on girls may limit their study time and hence negatively affect their academic performance and progression—causing an increase in school drop-outs (50). The government must work closely with grass-root non-government organizations to inform and educate people about the importance of continuity of education. Universal basic income could be considered to minimize the emergent effects of COVID-19 (51).

People from these communities also tend to have poor levels of education and literacy, and as a result, do not adequately receive public health messages (47). Adherence to public health recommendations is essential to reducing exposure to infection. Thus, there must be an increase in targeted efforts to improve awareness about public health measures such as social distancing, regular handwashing and use of masks among people from low socioeconomic backgrounds. Therefore, public health initiatives should aim to actively identify such communities and adapt suitable medium of communication utilizing community-level health workers.

## Impact of COVID-19 on Ethnic or Minority Groups

Pandemics invoke irrational fear and uncertainty (52). These are propitious grounds for the vagaries of hate, stigma, discrimination, racism and xenophobia to develop. Unfortunately, people from ethnicity/minority groups such as blacks, people from minority groups e.g., those from Asian and Indigenous backgrounds are more likely to be the target of hate, abuse, and sometimes violence (53). The act of xenophobia takes

various channels including social media. There are increasing reports of people from Asian backgrounds being targeted (54). It is a valid argument to postulate that these acts can rapidly scale through misinformation and social media and messaging applications, warranting a need for governments to continually monitor such events or sentiments. Targeted awareness programs are required by appropriate authorities to debunk the myth linking specific communities to COVID-19. Efforts to reinforce that pandemics such as COVID-19 affect one and all, irrespective of culture, community, creed, sex, race, and ethnicity. Infectious disease is agnostic of ethnicity, race, and cultural background of the people it affects. Political leadership must observe caution and desist from making inflammatory statements that could invoke stigmatization and xenophobia.

In the United Kingdom (UK), increasing concerns have been raised over the disproportionately higher proportion of deaths of people from the black and minority ethnic (BAME) background and those working for the National Health Service (NHS) during the COVID-19 (1). The UK government has launched an official review into why members of the BAME community are worst hit.

Previous data have shown that people of ethnicity and color have relatively poor access to healthcare services and the provision of treatment (55–58). During crises like COVID-19, these syndemic factors become important as to how historical health and social disparities along with emerging or current factors, such as epidemics, exacerbate the negative consequences on ethnic or minority groups (58). Therefore, authorities should ensure that pharmacies or local primary healthcare facilities are accessible to these communities in hours of need. Special consideration with regards to public health measures needs to be taken to protect and safeguard the health and well-being of people from indigenous backgrounds. One such measure taken by the Australian government was the limiting of travel to areas inhabited by indigenous populations in the Northern Territory, to isolate and protect these communities from exposure to COVID-19 (59).

Indigenous communities face a significant lack of access to health and justice systems (60, 61). Justice is critical to ensure that the individual rights of these communities are protected in these uncertain times. In a crisis like COVID-19, these communities are more likely to face a greater burden of unemployment, which may have a potentially cascading impact on their families. These considerations need to be addressed by the concerned family and welfare government institutions. Any public health preventative interventions or measures should be developed in consultation and with the informed consent of Indigenous people.

## Impact of COVID-19 on Immigrants and/or Refugees

Recent years have witnessed a meteoric rise in the mass-scale forced displacement of people due to climate change, political crisis, humanitarian disaster, war and violence. Tertiary care health systems remain the safety net to these vulnerable populations who have fled homes without a certain abode. Migrants and refugees are at a higher risk of infection and negative consequences of pandemics due to desperately poor



sanitation facilities, cramped conditions, limited access to healthcare and lack of financial resources to sustain families (62, 63). In places such as Kutupalong Camp in Bangladesh, currently housing over 600,000 displaced people in a mere area of 13 square kilometers, practicing social distancing is near impossible (64). Without access to clean water, promotion of hand-washing guidelines is also of little use in such camps. Should an outbreak occur in these areas, it is likely to spiral out of proportion. Authorities must make serious efforts toward providing clean water and sanitation facilities in these areas. Close monitoring of the spread of infection in these areas, including infectious disease control measures such as contact tracing, needs to be undertaken. In situations of extreme overcrowding and poor sanitation, evacuation of these camps must be considered. Currently, Doctors Without Borders is urging for the evacuation of refugee camps in Greece (65).

Language barriers also greatly limit the access of immigrants and refugees to public health messages (63). These populations must be empowered to take control of their health and engage with prevention strategies, by being provided accurate information in the appropriate languages. Given that refugees are often disadvantaged or vulnerable, they are less likely to trust governments or political systems. Thus, the involvement of stakeholders and leaders of these communities is critical to ensuring that preventative measures such as social distancing and handwashing are strictly adhered to whenever possible. Legal constraints decline refugees and immigrants' access to government welfare such as Centrelink (66). In such times of financial hardship, the livelihood of these populations is at risk of being severely compromised. To allow families to maintain food security, accommodation and health, governments should provide financial assistance, in recognition of these exceptional circumstances. Several countries have imposed strict border controls in response to the pandemic (67). This puts those who are seeking asylum at significant vulnerability and is against the spirit of international refugee law. Appropriate legal aid to asylum seekers should be provided by international humanitarian organizations. The long-term impact of COVID-19 on refugees and asylum seekers need further research.

### Impact on Justice-Involved Populations

The justice-involved population living in jails, prisons or custodial settings are particularly vulnerable in the COVID-19 era owing to the increased viral infection transmission risks due to crowded living conditions (68, 69), and relatively higher prevalence of specific medical conditions including poor cardiovascular disease profile, tuberculosis, sexually transmitted infection, substance abuse, and mental health disorder (70, 71). Jail inmates and prisoners have average to high cardiovascular disease (CVD) risk compared with community dwellers (72). Notably, individuals from lower socioeconomic backgrounds or belonging to ethnic or minority groups are inordinately incarcerated (73, 74). Moreover, history of incarceration is associated with CVD risk factors and poor prognosis (even death) from CVD (71). Therefore, targeted public health measures to minimize the transmission within this vulnerable population living in correctional facilities should be considered (75).

### Impact of COVID-19 on Remote Areas

People living in remote areas are more likely to be impacted by travel restrictions imposed by governments, as they need to travel long distances to access healthcare (76). This is particularly concerning for medical emergencies (31, 77). With the reorganization of health systems and repurposing of healthcare workers, it may be challenging to avail treatment at health facilities (29). Travel restrictions will also jeopardize ongoing care of chronic disease patients, who may not be able to access treatment locally.

Telemedicine facilities should be made available to enable the continued availability of healthcare to people living in remote areas (10, 78, 79). This has proven to be challenging as increased demand and inadequate staffing of internet providers have negatively impacted broadband services. Efforts must be taken to improve access to the internet, particularly for remote populations who are often unable to access healthcare by any other means. Deployment of mobile COVID-19 testing facilities should also be considered, to enable early detection and control of infection in rural and remote populations.

### Impact of COVID-19 on Chronic Diseases

The burden of COVID-19 has been severe for patients with chronic diseases such as obesity, cardiovascular diseases (heart disease and stroke), cancer, diabetes, chronic respiratory diseases, bone and joint disorders, genetic disorders, chronic neurological diseases (on immunosuppressive therapies (multiple sclerosis) and bulbar weakness (motor neurone disease) and mental disorders (29, 30). Patients with chronic disease are at increased risk of COVID-19 infection (80, 81). Mortality due to COVID-19 among chronic diseases could be substantial (81). Chronic disease patients with underlying risk factors such as age, obesity, lack of physical activity, tobacco use, poor nutrition and excessive alcohol consumption could be exposed to further risks due to COVID-19. Those with infection are at relatively higher risk of fatality (82, 83). Increased concerns about continuity of care, healthcare worker shortage, reorganization of health services, and limited access to testing and medical supplies have severely impacted patients with chronic diseases (83).

### Impact of COVID-19 on Patients With Cardiovascular Disease

Patients with underlying cardiovascular diseases, such as but not limited to—heart diseases, chronic stroke, obesity, and diabetes, are recognized to be at high risk of COVID-19 infection (29, 84–92). Substantially higher mortality risk has also been observed among critically ill COVID-19 patients. Acute cardiological manifestations of COVID-19 including heart failure, arrhythmia, left ventricular dysfunction and acute coronary syndromes have been observed (92). Indications on decreasing hospital presentations of acute cardiac events, presumably due to COVID-19 fear among patients, are concerning (93). Marked health inequities exist among individuals with cardiovascular diseases, diabetes and obesity across both low-income, middle income and high-income countries (94). The Prospective Urban Rural Epidemiologic (PURE) study found that the low-income and middle-income



countries (LMICs) carry the highest burden of cardiovascular disease (95). Lower levels of education in LMICs are associated with increased CVD incidence rates and CVD-linked absolute case fatality rates (CFRs) despite better overall CVD risk factor profiles. However, these individuals have markedly poorer medical care apropos to management of diabetes and hypertension, and secondary prevention (95). Moreover, ethnicity and race linked disparities exist in CVD disease risk and associated deaths, e.g., the higher prevalence of CVD risk factors among Black patients than the Whites (96, 97). The impact of psychosocial (e.g., stress among patients with CVD) and environmental (pandemic) stressors, due to social distancing and quarantine measures, on cardiovascular health in general, and those with CVD in particular warrant further research.

### Impact of COVID-19 on Cancer Populations

Cancer patients bear a great financial burden, due to the significant expenses associated with treatment. This has a disproportionate impact on people of low socioeconomic status (SES) who are often unable to afford therapy. Nationwide data from Australia showed that cancer outcomes in patients were influenced by patients' post-codes, with those living in low socioeconomic areas having the lowest 5-year survival and highest mortality rates (98). Another analysis of people with metastatic breast cancer in the United States (US) found that uninsured people were more likely to refuse or delay treatment due to cost, compared to those who were insured (99). As resources in public hospitals become increasingly scarce, patients of low SES that do not have access to private healthcare may experience greater delays in treatment. In Australia, remote areas receive an undersupply of medical practitioners and diagnostic facilities, resulting in diagnostic delays, limited early detection, and significantly poorer cancer outcomes in rural populations. Moreover, these patients are often required to travel to metropolitan areas to receive treatment (100). The COVID-19 pandemic is likely to exacerbate these conditions, as travel bans and disruption of existing cancer services further limit access to treatment for these populations (7). The burden is worsened in developing countries such as India, where nearly 70% of the national population resides in rural areas and must travel to urban tertiary care centers for treatment (101, 102). Studies have also revealed racial disparities in access to cancer treatment worldwide (103, 104). Furthermore, inequalities between SES groups are also significant within developing countries. Although data from low-income countries is sparse, the available evidence indicates higher mortality rates among people with lower SES (105).

### Impact of COVID-19 on Chronic Neurological Patients

The reorganization of the healthcare system, as well as travel restrictions, has made it challenging to maintain ongoing care of patients with chronic neurological conditions especially those on immunosuppressive treatment regimen (e.g., multiple sclerosis) or with bulbar weakness (e.g., motor neurone disease) (30). While telemedicine is being implemented as a substitute for in-person consultations, many patients, due to limited literacy and access

to appropriate technology may be unable to access services (10). Doctors have reported a sudden decrease in the number of patients presenting to hospitals with acute neurological events such as stroke, likely due to fear of contracting COVID-19 infection (31, 93, 106). This is problematic as the delay in reperfusion therapy may have fatal consequences (107–109), especially to patients with underlying chronic neurological disease (30). Likewise, there are also concerns related to the postponement of elective surgeries, therefore, the impact of delayed surgery on long-term morbidity needs further study. Health strategies to minimize the impact of the pandemic on patients with neurological conditions should include considerations of individual comorbidities or health profile as well as the socioeconomic variables associated with health. Patients who might be at high risk of an acute flare-up (such as transient ischemic attack or acute stroke) should be monitored using telemedicine and if necessary, be brought for the emergent procedure (30, 31). In the wake of COVID-19, certain diagnostic and treatment workups need to be reconsidered to limit infection exposure to patients and healthcare workers.

### Impact on Mental Health

Before the COVID-19, mental health has been a subject of major concern due to rising numbers around the world (110). In the pre-COVID era, worldwide, 800 000 people died due to suicide every year; it was a second leading cause of death among youth (15–29-year olds) globally (111). The major burden of suicides occurs in LMICs accounting for 79% of all suicides recorded globally in 2016. For example, in Australia alone, on average 8 Australians commit suicide every day, with suicide rates in 2015 amongst Aboriginal and Torres Strait Islander people (5.2%) were more than double the national rate (1.8%) (112). In addition to the personal and family suffering as well as damage to the community mental illness causes, the costs to the economy are gigantic (113).

In the COVID-19 era, social distancing, increasing joblessness and limited access to mental health services, mental health burden is bound to aggravate during and beyond the pandemic (110). Several surveys on general public have reported increase in COVID-19 related depression, anxiety, and stress owing to the psychosocial stressors (114–117). Among healthcare workers, clinical symptoms of depression, anxiety, insomnia, and distress have been reported with a prevalence rate higher than the general public (27). Lack of social support and communication, a lack of disaster training and maladaptive coping strategies increase the risk of negative psychological or mental outcomes (27, 118). To reduce adverse psychological outcomes among frontlines healthcare workers, targeted preventive and mitigation measures including stress coping strategies are recommended (118, 119).

Increasing loneliness, economic downturn, and stress invoked by living through a crisis place the entire population at high risk of psychological disorders such as depression, anxiety and substance abuse (120, 121). Zhang et al.'s study on health and well-being of normal adults after 1 month of confinement in China showed worse mental and physical health distress and life satisfaction among adults who did not work in the outbreak (122). This study gives insights on developing targeted

interventions to limit the negative impact on health and well-being of specific groups who might benefit from appropriate intervention including targeted treatment and social assistance.

Social restriction and quarantine imposed by various governments during COVID-19 will have a psychological and psychiatric impact (123, 124). Moreover, mental health consequences are likely to be more severe in socially vulnerable populations that are experiencing the greatest challenges during the pandemic (125, 126). Provision of remote psychiatric or psychological assistance through telemedicine should be considered (10). The vulnerable communities would need targeted interventions to help them cope with loneliness, fear, stigma and acute distress (127). Mental health screening programs to identify those at higher risk of suicide could be explored. Programs that have shown efficacy in improving psychological and mental health during previous epidemics such as the Zika virus outbreak could be used as a foundation to develop COVID-19 specific interventions (128). Population-level programs to monitor behavioral, interpersonal and psychological reactions to the COVID-19 could be considered to identify populations or communities at greatest risk.

## Impact of COVID 19 on Critically Ill Patients and Their Families

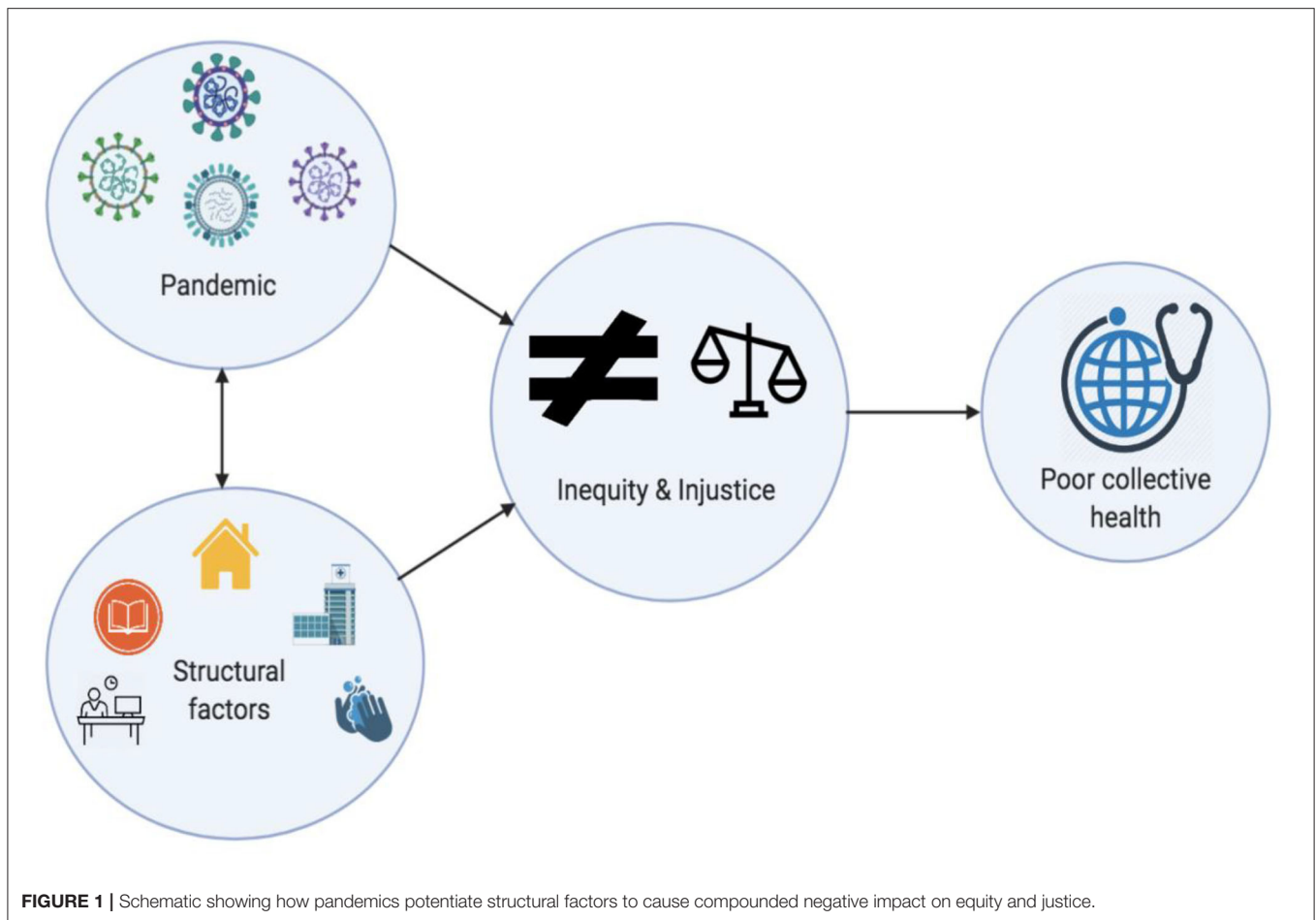
The COVID-19 patients who are critically ill, spend their last few days in ICU separated from their loved ones. The lack of PPE and strict ICU isolation protocols led to the death of most patients in ICU alone and away from their close family (129). The health care personnel who communicate to the close family members, experience extreme anguish, and this has a lasting psychological impact and moral injury on the health care workers. In several countries, visits to critically ill and funerals have been banned due to the high risk of contagion (129). This in several cultures would lead to intense pain and suffering to the family as it could be against their respective culture and tradition. Nobody wishes to die alone, but the fact that many patients are dying alone without being able to meet or communicate with their family one last time. Some countries are allowing family viewing of the deceased under strict infection control measures (130). Just like how telehealth and virtual meetings are becoming the new normal, we may have to use telecommunication for the patients to be able to communicate with their families remotely. This may not be evidence-based medicine, that we so wish to practice, but maybe considered part of compassionate care provided to the dying, as well as to their friends and family.

## DISCUSSION

Prolonged public health or humanitarian crises can act as a catalyst to realign civilizational priorities with a focus on health, equity and justice. COVID-19 has led to an unprecedented surge in fear, dismay and disbelief (22, 52, 121, 128). Pandemics have a disproportionate impact on the health and socioeconomic status of people from vulnerable backgrounds (Figure 1). These communities face exacerbated inequity and injustice (131). Healthcare workers, homeless, elderly, people

of lower socioeconomic backgrounds, those from ethnic or minority groups, immigrants and/or refugees, justice-involved populations (incarcerated), people with disabilities, those living in remote areas, with disabilities and with chronic conditions are experiencing a disproportionate burden of the COVID-19. Increasing media reports are highlighting the palpable inequity and injustice that are currently being experienced by the community, more so by those who come from vulnerable backgrounds. These vulnerabilities are further exacerbated in under-resourced settings. The impact of the disease has ramifications well-beyond those who have been infected and those who die from the infection. The pandemic of this scale and geographical breadth have raised serious concerns about the capacity of our health systems to cope (132). On a community level, we are witnessing a breakdown of existing infrastructures causing challenges in access and compliance. History tells us when aspects of equity and justice are neglected, the systems either have to be restructured or it will be forced to reboot by default (133).

Recent statements by the Director of National Institute of Allergy and Infectious Diseases in the United States of America, Dr Anthony Fauci, about the possibility “that Americans could eventually carry around certificates of immunity to the coronavirus once proper testing is widespread enough” raise concerns (134). How this will impact vulnerable communities remain to be seen. This along with the idea of creating an “immunity registry” are also concerning. There are concerns that such a registry could be misused to profile those from vulnerable communities leading to further marginalization. The announcement by the current administration in the United States, to put a halt on the funding to the World Health Organization (WHO), will severely impact the international coordination efforts to mitigate COVID-19 outbreak as the United States is a major funder (135). COVID-19 has invoked a raging debate on the urgent need to revisit commitments by individual governments toward health equity and justice (136). In this vein, models of universal healthcare that have been successfully implemented in some countries may act as templates for relevant governments to prioritize health and justice for their populations (137). Contemporary models to combat inequities in access to care and protect vulnerable communities give hope to build sustainable universal healthcare infrastructure. The *Ayushman Bharat Pradhan Mantri Jan Arogya Yojana* scheme introduced by the Indian government provides free health coverage to 500 million of the most disadvantaged members of the Indian population and its implementation has been promising (138). Brazil’s national health system—*Sistema Único de Saúde* (SUS)—provides financial support to approximately 70% of its population (139). Spain also has a public health system which assures universal coverage for all Spanish nationals regardless of economic background (140). These systems provide “safety nets” to the most vulnerable communities in hours of crisis. A more equitable allocation of funds for the improvement of primary healthcare in all countries across the globe is the need of the hour (141). The doctor-patient ratio has to be improved to provide a uniform distribution of healthcare to remote locations and lower socioeconomic status (142).



Ongoing management of patients with chronic disease is essential to minimizing the progression of the disease and should be ensured (29). Doctors are recommended to utilize telemedicine to reach out to patients virtually when possible and reduce in-person visits to the clinic (10). To facilitate this, we urge governments to reimburse all healthcare providers for teleconsultations. Patients should continue receiving treatment, unless the risks of doing so outweigh the benefits, as per the judgement of the responsible clinicians. If treatment cannot be administered remotely, patients should be encouraged to present to hospitals for treatment, and all necessary precautions must be taken to minimize the risk of COVID-19 infection transmission. For patients who do not have access to a private vehicle, provision of transportation to and from the hospital could be organized for patients with limited physical mobility. Early detection of chronic diseases is crucial to prevent fatal progression. Thus, we recommend the continuation of existing screening activities (e.g., breast cancer screening program), with strict adherence to PPE and handwashing guidelines. Patients with acute cardiac and/or neurological symptoms should be encouraged to access treatment as the absence or lack of treatment could have a devastating impact on individuals (31).

Contracting COVID-19 infection could be fatal for patients with chronic disease particularly those with severely

compromised immune systems and CVD risk factors including but not limited to obesity and advanced age (29). We recommend regular telemonitoring of all patients for COVID-19 symptoms, such that immediate action can be taken for suspected infection. Chronic disease wards should be divided into COVID-19 positive and COVID-19 negative wards. Patients with a suspected infection should undergo diagnostic testing, and those who test positive should be monitored for progression of symptoms. If their condition deteriorates, we recommend direct routing of these patients to COVID-19 positive chronic disease ward, to circumvent exposure to the emergency department. Critically ill patients and their loved ones should be given special consideration on compassionate grounds so that the families and the ICU staff could have closure and potential adverse psychological impact on healthcare staff (due to moral injury) and families could be thwarted.

In conclusion, unprecedented times deserve unprecedented measures. The social and economic determinants of health mediate the impact of crises such as a pandemic (41–45, 143). Factors related to individual socioeconomic status, underlying morbidity and external factors such as diminishing access to healthcare and justice systems could deepen the inequity and injustice divide during and beyond the COVID-19 era (13, 131, 141). Factors such as universal health care access, provision of

education for all, protection from disasters including caused by pandemics and climate change, justice to all, and equality in opportunity affect how communities and nations respond and cope with the crisis (51, 131). For us to have a comprehensive approach to be able to recoil back into a functioning society, efforts to address these determinants are important. Digital technologies such as big-data analytics and artificial intelligence could be leveraged in surveillance and care of people from vulnerable communities during and beyond-COVID-19 (79). Furthermore, individual governments should allocate dedicated funding to support ongoing research and development and public health surveillance of current and long-term impact of COVID-19 on vulnerable populations. Without a holistic approach to building sustainable and inclusive systems that address health inequity and injustice, we will continue to be vulnerable to pandemics such as one that we face now, and those that may occur in future (144). It is also important that COVID-19 mitigation strategies should not stigmatize or marginalize vulnerable communities (9). Identifying vulnerable members of the community and those at high-risk should be an integral part of pandemic public health response strategies. We urge governments to take a proactive approach toward realignment of national efforts on creating sustainable planetary health, justice and environmental systems—one that could protect our generations in face of a pandemic or prolonged crisis (12, 136, 145).

## AUTHOR'S NOTE

The COVID-19 pandemic is causing an unprecedented public health crisis impacting healthcare systems, healthcare workers,

and communities. The COVID-19 Pandemic Health System Resilience PROGRAM (REPROGRAM) consortium is formed to champion the safety of healthcare workers, policy development, and advocacy for global pandemic preparedness and action. This paper could only consider developments until April 30, 2020, at the time of manuscript writing and submission; however, some updates were considered and added during the revision of the manuscript in October–November 2020.

## AUTHOR CONTRIBUTIONS

SBh devised the project, the main conceptual ideas and proof outline, and coordinated the writing and editing of the manuscript. SBh and AR wrote the first draft of the manuscript. SBh encouraged AR to investigate and supervised the findings of this work. All authors discussed the results and recommendations and contributed to the final manuscript.

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# Psychological Well-Being, Marital Satisfaction, and Parental Burnout in Iranian Parents: The Effect of Home Quarantine During COVID-19 Outbreaks

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Coronavirus disease 2019 (COVID-19), as an infectious disease, is now prevalent in many countries around the world, which has recently led many governments to home quarantine and impose penalties for violating quarantine. Concerns and stress caused by lockdown and social isolation led to personal and interactive reactions in some families, which are also culturally important to address. This study was administrated to study the psychological well-being and the effect of home quarantine on marital satisfaction (MS) and parental burnout (PB) from parenting responsibilities during the prevalence of COVID-19 in Iranian parents. A total of 213 parents (140 mothers and 73 fathers) voluntarily participated in the online survey in the period of February to mid-April 2020 and completed the 5-item index of the well-being of the World Health Organization (WHO-5), the Kansas Marital Satisfaction Scale (KMSS), and the Parental Burnout Assessment (PBA). The results showed that the effect of home quarantine on MS and PB was not significant in parents ( $p > 0.01$ ). The interactive effect of home quarantine and gender was not significant on MS and PB ( $p > 0.01$ ). In addition, the mothers significantly reported higher PB than the fathers, but the fathers had higher scores in MS and psychological well-being ( $p < 0.01$ ). The effect of some demographic factors on the studied variables was also significant. Supportive resources in family-based culture may play an essential role to reduce the negative effects of stressful situations on family interactions.

**Keywords:** well-being, parental burnout, marital satisfaction, home quarantine, COVID-19

## INTRODUCTION

Coronavirus disease 2019 (COVID-19), as an infectious disease, is now recognized as a highly prevalent disease that affects a large number of people, especially the elderly and people with a background of health problems (World Health Organization [WHO], 2020). Since no definitive treatment has been discovered so far to treat this prevalent disease, the only way to cope with the disease and cut off the virus transmission chain is to do personal hygiene and keep physical distance from others in daily interactions. This has led governments to quarantine people at home and impose penalties for violating these laws. This type of home quarantine is called lockdown,



and with the onset of the COVID-19 outbreak, millions of people around the world are living in conditions of social isolation and constraint on social interactions (Taub, 2020).

In Iran, after closing all public places and forcing people to stay at home and not moving in public places, people's interactions were limited. This time almost coincided with the beginning of the Iranian New Year. Since Iranian culture is a culture based on family and kinship interactions, it imposed severe restrictions on an individuals' access to relatives and friends' networks; worry, death anxiety, and feelings of hopelessness were among the concerns raised in people's contacts with the counseling section of the Welfare Organization (Welfare Organization of Iran [WOI], 2020). Such a condition, as an external, major, non-normal, out of control and unpredictable stressor to cope, has been unprecedented in the history of the world and has led to different forms of self-isolation and can cause different behavioral and emotional reactions (Gallagher, 2020) in different individuals with different cultural backgrounds. Such psychological reactions due to the decline of social relations are more evident in traditional cultures; researchers have shown that decreased emotional contact and feelings of connection with family and friends are associated with symptoms of distress and depression in African-Americans (Taylor et al., 2016, 2020). Recent studies have shown that social distancing by creating a sense of loneliness, anxiety, suicide ideations (Armbruster and Klotzbücher, 2020), low perception of social support, and an inability to connect with others is associated with low well-being and low sense of social connectedness (Emerson et al., 2020; Garcia et al., 2020). In addition to the personal effects of the lockdown, home quarantine and social distancing challenged the value and the cost of relationships with others. In such situations, people accept staying at home and distancing from friends and family as the cost of maintaining their physical health, while with self-exclusion of the social network, they were imposed lots of psychological harm. However, the side costs of staying at home for a long time, such as multiplying the caring responsibilities of spouse and children (Long, 2020), are also a matter of consideration.

Due to the novelty of studies on the personal and interactional effects of home quarantine caused by the coronavirus outbreak, the current study was conducted to investigate the effect of home quarantine on psychological well-being and marital and parental outcomes in families living in Iran.

## Stressful Life Events and Psychological Well-Being

Mental health has been defined as the absence of mental disorder (which enables a person to fulfill the personal growth and experiences of happiness and satisfaction) (World Health Organization [WHO], 2001). Thus, psychological well-being is an integrated process apart from mental disorder that involves a concept of more than happiness and includes a concept of optimistic development (Fen et al., 2013). Psychological well-being is the first element that is threatened in the face of stressful life events. Stressful life events with dimensions including challenging the adaptive mechanisms of the individual

(Holmes and Rahe, 1967), being threatened (Cohen et al., 2016), imposing demands on the individual over accessible resources (Lazarus and Folkman, 1984), and disrupting the achievement of life goals (Kemeny, 2003) have many physical and psychological consequences for a person (Cohen et al., 2019). Cleland et al. (2016) showed that stressful life events, such as losing a good relationship, health problems, and economic problems, have negative impacts on mental health. Following some epidemic economic crises, negative social consequences, including declining economic well-being, physical and psychological problems, and the adoption of relevant coping strategies, are predictable (Aytaç et al., 2015). The prevalence of an unknown and epidemic disease, such as COVID-19, as a stressful event that affects a large number of people (Delle Fave, 2014) reduces the psychological well-being (Philip and Cherian, 2020; Sibley et al., 2020), threatens social relationships, social confidences, and maintaining connections (Delle Fave, 2014), weakens the socio-economic position of the individual, loses a sense of control over life events, and reduces the feeling of life satisfaction (Rubio et al., 2018), especially when it was considered as an unpredictable and chronic disease, and when it occurs for at-risk groups, such as the elderly or people with emotional disorders (Schneiderman et al., 2005; World Health Organization [WHO], 2009).

The prevalence of the unknown coronavirus disease as a stressful event, in addition to direct effects on health, due to forcing people to quarantine at home can have several psychological consequences on individuals. Limited studies in this area show that lockdown and being isolated have significantly increased feelings of loneliness, anxiety, stress, and suicide in people living in European and American countries (Brodeur et al., 2020). Other evidence suggests that children in quarantine situations experience feelings of anger, fear, loneliness, and boredom despite feeling happy and relaxed with family (Idoaga Mondragon et al., 2020). Conversely, the study of Recchi et al. (2020) on the French population before and after the outbreak of coronavirus indicated an improvement in well-being and health in the unaffected majority; however, people with low income and who lost their job or those who worked long hours at home reported higher levels of stress (Prickett et al., 2020).

## Stressful Life Events, Lockdown, and Parental Burnout

The home quarantine and lockdown situation caused by the COVID-19 crisis have affected the well-being of families and challenged the ability of parents to carry out parenting responsibilities by imposing more education and care responsibilities (Mangiavacchi et al., 2020). The closure of schools and some businesses imposed many housework and childcare responsibilities on parents, especially on mothers (Farré et al., 2020). Alon et al. (2020) and Hupkau and Petrongolo (2020) showed in a survey of United States and United Kingdom families that housework, childcare duties, and the role of teaching for children have put more pressure on parents, especially on mothers. Stressful situations by influencing people's coping strategies are associated with the high negative mood symptoms

of depression, anxiety, and stress in parents (Mather et al., 2014; Flouri et al., 2018), symptoms of burnout (Mather et al., 2014), and parent-child dysfunctional interactions (Platt et al., 2016). Some studies have shown that lack of control, household workload, role confusion, and irrational environmental demands especially caused by stressful events, such as the COVID-19 pandemic (Griffith, 2020), have led to negative emotions, such as exhaustion, feelings of helplessness, frustration, and finally parental burnout (PB) in caregivers (Vinayak and Dhanoa, 2017; Mikolajczak et al., 2018a).

Parental burnout is a state of emotional exhaustion that is associated with a change in positive attitudes toward children (Luescher et al., 1999) and is defined in four dimensions as the feeling of exhaustion of parental role leading to low parental efficiency, feeling of fed up, contrast with the past parental role, and emotional distancing from children (Roskam et al., 2018). Studies have shown that PB is associated with parent-child demographic factors, such as the age of mother and child, the number of children at home, the number and gender of caregiver, socio-economic status of the family, the physical and mental conditions of parent-child (Blanchard et al., 2006; Norberg, 2007; Lindström et al., 2011; Vinayak and Dhanoa, 2017; Le Vigouroux and Scola, 2018; Mikolajczak et al., 2018b; Mousavi et al., 2020), personal factors, such as emotional intelligence and high parental self-efficacy beliefs, and interactional factors, such as positive parenting practices, co-parenting, and marital satisfaction (MS) (Mikolajczak et al., 2018b).

## Stressful Life Events, Lockdown, and MS

Marital satisfaction as the indicator of the marriage quality (Fincham and Beach, 1999) is defined as the mental experience of happiness in a marital relationship (Hendrick et al., 1998), which reflects the perceived benefits and values of marriage (Baumeister and Vohs, 2007), a subjective evaluation that varies under the influence of happy and unpleasant life events (Li and Wickrama, 2014). The challenging events in the context of the family are changes, and people no longer simply feel satisfied after the changes (Maltas, 1992); changes caused by stressful events led to stress and act as a threat to satisfaction and intimate relationships (Randall and Bodenmann, 2009). Stressors, especially external factors, first by reducing opportunities to strengthen relationships and distracting couples from spending time to improve intimacy in relationships and then by weakening their abilities to cope with stressors, create problems for couples (Neff and Karney, 2017). Some studies have shown that external stressors including natural disasters are associated with decreased MS (Chi et al., 2011). Studies have also shown that stressful events (e.g., declining level of welfare and low income) have a significant association with decreasing marital stability (Bahr, 1979), poorer marital interactions and low MS, especially in the first years of marital life (Bodenmann, 2000; Bodenmann and Cina, 2006), sexual problems in intimate relationships (Bodenmann et al., 2007), criticism of spouse, and reduction of dyadic support (Neff and Karney, 2009), low MS, and high psychological distress with mediating role of problem-solving (Cohan and Bradbury, 1997)

or management skills (Li and Wickrama, 2014) and coping strategies (Fink and Shapiro, 2013).

The prevalence of the COVID-19 pandemic as an external stress has challenged the quality of couples' relationships; home quarantine with negative psychological effects, such as anxiety, stress, depression, and frustration (Brodeur et al., 2020; Idoiaga Mondragon et al., 2020), and making changes in the unemployment rate and reducing access to financial opportunities (Coibion et al., 2020), forcing distress couples to spend many hours of the day together and increase the capacity for marital conflicts (Perez-Vincent et al., 2020), can have negative effects on couples' relationships; these effects become more destructive due to different backgrounds, such as low economic quality and low levels of vulnerability (Pietromonaco and Overall, 2020). Kevin and Rislá (2020) showed that couples with low income reported low MS during the lockdown or distressed couples experience worse individual and dyadic outcomes in the face of external stress (Beach et al., 1994). Conversely, some other evidence suggests that external stresses in a good marital relationship, despite weakening the relationship at the beginning of the encounter to stress, cause spouses to adapt to new conditions and strengthen the dyadic relationship in later stages (Bonanno, 2004). Therefore, to clearly understand the effect of stress on couples' relationships, it is helpful to pay attention to the source of stress, the intensity of stress, and the duration of exposure to stress (Randall and Bodenmann, 2009) with regard to personal, relational, and cultural backgrounds of couples.

## Gender Differences in Well-Being, PB, and MS

Gender plays an essential role in the distribution of role and power in the family and social status (World Health Organization [WHO], 2019). High non-stop parental and household tasks, the monotony of endless daily affairs, and the low level of control in mothers can be an explanation for the poor mental health compared with fathers (Baruch et al., 1987). This is why the prevalence of emotional disorders is higher in women than in men (World Health Organization [WHO], 2019). In other studies, mothers reported more stress and anxiety, less well-being (Skreden et al., 2012; Meier et al., 2018; Nelson-Coffey et al., 2019), less happiness, more fatigue, and consequently, less leisure time and sleep (Musick et al., 2016), which is explained by the more limited role of fathers in parenting and social isolation (Skreden et al., 2012).

Many studies have shown that it is the mothers who, as the primary and permanent caregivers of the children, are more exposed to PB than the fathers (Le Vigouroux and Scola, 2018; Lebert-Charron et al., 2018; Mikolajczak et al., 2018b; Roskam et al., 2018; Roskam and Mikolajczak, 2020). Mothers, especially those who have young children or more children or who do not have the capacity of fathers to cooperate in parenting responsibilities, suffer from more PB (Hubert and Aujoulat, 2018; Mikolajczak et al., 2018b). Mothers also felt more burned out than fathers because of high parenting expectations and social pressures for being a

perfect mother (Meeussen and Van Laar, 2018; Sorkkila and Aunola, 2020) and were characterized by feelings of guilt, anxiety, and severe depression (Sánchez-Rodríguez et al., 2019), although fathers reported more negative consequences for PB, such as suicidal ideation, running away, and child neglect (Roskam and Mikolajczak, 2020).

Although parenting in mothers is associated with more reports of burnout (Roskam et al., 2018; Roskam and Mikolajczak, 2020), having children is one of the hallmarks of MS in mothers (Twenge et al., 2003). Beam et al. (2018) attributed the gender difference in MS to the difference in the structure of their marital quality. Olson et al. (2008) found that women were more likely to complain than men from distancing to successful marital life standards and were more sensitive to marital problems. Job satisfaction, communication, mutual understanding, and sexual satisfaction were reported as important components of MS in men and the same factors except for sexual satisfaction in MS in women (Ayub and Iqbal, 2012). In the study by Ogolsky and Bowers (2013), maintenance behaviors were reported to lead to MS in women more than in men, and women's MS was greater when their husbands accompanied them in spending time with their children and supported them in caregiving (Rhyne, 1981; Leung, 2020). Therefore, increasing MS in mothers is associated with increased participation of fathers in the home and high family cohesion (Korja et al., 2016; Liu and Wu, 2018) and parent-child interactions (Yoo, 2020).

## Current Study

The unexpected occurrence of infectious disease of COVID-19, the coercion of people into home quarantine, in addition to hearing the news of daily deaths, preventing people from holding mourning ceremony for lost loved ones, closing schools and businesses, and the resulting economic pressure on low-income groups, and so on, caused anxiety and seeing an uncertain future ahead, that the only way to cope with this phenomenon was to distancing from the community for cutting off the chain of disease outbreaks. The pressure of new circumstances on individual and relationship outcomes in Iranian families led the researcher to evaluate the effects of the coronavirus outbreak on well-being, marital outcomes, and parent-child interactions by investigating the families' perceptions of the pre-post outbreak of coronavirus condition. Hence, to assess MS and PB before and after the COVID-19 outbreak (home quarantine condition), the researcher presented both scales into two sections with past and present tense verbs (perception of MS and PB in the pre-outbreak condition and how they are feeling now about their marital and parental outcomes) to test the research hypotheses as follows:

*Hypothesis 1:* The home quarantine due to the COVID-19 outbreak has increased burnout and reduced MS among Iranian parents.

*Hypothesis 2:* The PB and MS scores of mothers and fathers are significantly different in the pre-post outbreak of COVID-19.

*Hypothesis 3:* The mothers and fathers are significantly different in well-being, PB, and MS scores.

## MATERIALS AND METHODS

### Participants

Due to the study of marital and parental outcomes, the statistical population of the current study includes all married fathers and mothers living in cities of Iran who have at least one child who needs care at home (without age limit), are literate, and have consented to participate in the study. From 215 parents who participated in this study with the exclusion of two mothers who had experienced death caused by COVID-19 in the family, a total of 213 parents remained, of whom 140 only mothers and 73 only fathers participated throughout Iran, and 91 parents were from Tehran (capital of Iran), and the rest of them were from different cities. The demographic characteristics of *mothers* were: age ( $37.43 \pm 7.22$ ), the length of the marriage ( $14.46 \pm 8.14$ ), the number of children (1-4 child), the level of education (up to graduation of high school = 38, bachelor = 49, MA/MS = 33, Ph.D. = 20), have paid activities ( $N = 67$ ) or not having ( $N = 73$ ), and welfare level of the neighborhood (non-prosperous = 6, average = 107, prosperous = 27).

The demographic characteristics of *fathers* were: age ( $41.95 \pm 8.6$ ), the length of the marriage ( $15.64 \pm 10.7$ ), the number of children (1-6 child), the level of education (up to graduation of high school = 6, bachelor = 24, MA/MS = 31, Ph.D. = 12), have paid activities ( $N = 72$ ) or not having ( $N = 1$ ), and welfare level of the neighborhood (non-prosperous = 4, average = 56, prosperous = 13).

### Procedure

The present study is cross-sectional and has a mixed factorial design. Therefore, this study has a within-subjects variable (home quarantine) with two facets (before and after the COVID-19 outbreak) and a between-subjects variable (gender) with two facets (fathers and mothers). The study was conducted for nearly 1 month and a half after the outbreak of COVID-19 that forced people to home quarantine in cities of Iran. Therefore, to evaluate the effect of home quarantine, the items of the scales were presented to the participants in both past and present tenses and in two sections including before and after the outbreak; thus, the research had two limitations: (1) the impossibility of conducting longitudinal research to evaluate the effect of home quarantine on the studied variables and (2) the impossibility of conducting a survey in paper-pencil to reach a high sample size; the online survey was used. The survey was administrated online (an Iranian online survey website<sup>1</sup>) from last February to mid-April 2020 for nearly a month and a half past the prevalence of COVID-19 in Iran and coincided almost with the beginning of the New Year (Nowruz Holiday) in Iran. The link of the survey was shared accompanied by a video clip introducing the research goal on social media including WhatsApp and Telegram, and so on. The project took almost a month to complete, and data analysis began after no one was added to the project for a week. All participants voluntarily participated in the online survey and were free to withdraw from participation. They were assured of

<sup>1</sup><https://porsline.ir>



the confidentiality of the information and the use of the results for academic research.

## Measures

*Demographic information* includes participants' information about the gender, the age of parents, the length of the marriage, the number of children, the level of education, have or not having paid activities, the welfare level of the neighborhood, and the experience of death due to COVID-19 in the family.

*Open-ended questions* are used to evaluate how the families react to hearing about outbreaks and deaths of COVID-19 and how to cope with this stress as well as how they spent time at home with their children. These questions were used for explaining the quantitative results, such as what is used in explanatory sequential designs (Wisdom and Creswell, 2013), and the well-being and parental outcomes of parents were described in details in the face of the COVID-19 outbreak and home quarantine.

*Marital satisfaction* is measured by the Kansas Marital Satisfaction Scale (KMSS). This 3-item self-reported scale assesses couples' satisfaction with the relationship, partner as a spouse, and marriage in a 7-point Likert scale from *extremely satisfied* (1) to *extremely dissatisfied* (7) (Nichols et al., 1983). Based on a meta-analysis study about MS tools, this scale had the highest reliability (Graham et al., 2011). Its convergent validity with the Relationship Assessment Scale (RAS) has been reported as 0.74 in Iranian couples (Dehshiri and Mousavi, 2015a). This scale is also used in two sections before and after the COVID-19 prevalence using the past (for example, "How satisfied were you with your relationship with your husband (or wife)?") and present tense verbs (for example, "How satisfied are you with your relationship with your husband (or wife)?"). In this study, Cronbach's alpha coefficient (before and after the outbreak) was obtained as 0.94 and 0.97, respectively.

*Parental burnout* is assessed by Parental Burnout Assessment (PBA). This self-report scale includes 23 items in a 7-point Likert scale from *never* (0) to *every day* (6) that was prepared by Roskam et al. (2018) to assess parental exhaustion from parenting responsibilities in four subscales: exhaustion of the parental role, contrast with the parental self in the past, feeling of being fed up, and emotional distancing from children. The scale was validated in Iranian by Mousavi et al. (2020), and Cronbach's alpha was obtained at the range of 0.60–0.93 for subscales. Participants were asked to express their perceptions of experiencing burnout before and after the COVID-19 outbreak that forced home quarantine in two sections with past (for example, "I couldn't stand my role as father/mother anymore.") and present tense verbs (for example, "I can't stand my role as father/mother anymore."). The Cronbach's alpha for the perceived PB before the COVID-19 outbreak was obtained at the range of 0.76–0.97, and after the outbreak it was at the range of 0.87–0.98. Since one of the points in the 7-point scale was "a few times a year" (6) and was not applicable for the post-outbreak condition, this point was removed from the scale, and it became a 6-point Likert scale (0–5). Like any disorder, PB naturally does not have normal distribution and positively skewed, so, to observe the

assumption of normality of the dependent variable for doing any parametric test, the natural logarithm conversion was used to normalize the scores.

*Psychological well-being* is assessed by the 5-item index of the well-being of the World Health Organization (WHO-5). This self-report scale is based on the WHO-10 scale that was prepared by Blom et al. (2012) and assessed the well-being of a person over the past 2 weeks on a 6-point Likert scale from *at no time* (0) to *all of the time* (5). Therefore, this scale was used in one section to assess the well-being of mothers and fathers in this situation (for example, "Over the last 2 weeks: I have felt calm and relaxed."). Higher scores indicate higher well-being, and lower scores show poorer well-being of a person. In a study to validate this scale in Iranian people, Dehshiri and Mousavi (2015b) found a Cronbach's alpha coefficient of 0.89. In this study, its Cronbach's alpha coefficient was obtained at 0.89.

## Data Analysis

After reporting the mean and standard deviation of well-being, PB, and MS, a mixed factorial design was used to assess PB and MS before and after outbreak conditions in both genders. To assessing its assumption, the normality test was applied. The skewness and kurtosis of well-being scores (−0.45 and −0.18) and the skewness (−0.155 and −1.8) and kurtosis (2.69 and 3.39) of MS scores showed that the distribution of scores is normal. Since the skewness (2.97 and 2.79) and kurtosis (7.54 and 7.41) of PB were not normal, so for the normalization of scores, the natural logarithm conversion was used, and the skewness (0.67 and 0.77) and kurtosis (−0.77 and −0.6) of PB were obtained. The Levene's Test results in MS scores also showed that the assumption of homogeneity of variance [ $F(1,211) = 1.07, p > 0.3$ ;  $F(1,211) = 2.91, p > 0.9$ ] was satisfied. However, the Levene's Test in examining the homogeneity of variance of PB scores showed that the variance of the two groups is not equal; based on variance ratio, the ratio of the biggest variance to smallest variance is less than 3, so, the variance of the two groups can be considered equal (Field et al., 2012).

To analyze the relationship between well-being, PB, and MS (in the present condition, i.e., after the outbreak) with other demographic variables, Pearson correlation analysis and one-way ANOVA were used in which the assessing of the assumptions of both tests showed, respectively, that the relationship between two variables was indicated as linear by the scatter plot and the normality of dependent variables distribution and the homogeneity of variances of dependent variables were satisfied.

In addition, the analysis type of open-ended questions was by content analysis that was done manually by analyzing, categorizing, and coding the themes in the responses of 213 participants. In coding the responses using inductive or open coding method, first, after getting a sense of all the answers to each question, a sample of data was read, and based on the themes, they were categorized, and their codes were assigned in Excel sheet; this process was continued until all the participants' responses were coded, similar responses were placed in pre-assigned codes, and new codes were assigned to new responses. Finally, all the categories and codes were reviewed to ensure that similar codes can be merged, and some irrelevant responses were



also removed. In total, out of three open-ended questions, 256 responses and 5 codes were assigned to the first question (how to react to the news of the coronavirus outbreak); 601 responses were analyzed, and in two coding steps, 11 and 3 codes were assigned, respectively, to the second question (how to reduce stress); and 528 responses were analyzed, and in two coding steps, 22 and 4 codes were assigned, respectively, to the third question (how to spend time with children).

## RESULTS

*Analysis of the responses to short questions:* In analyzing the psychological reaction to hearing the news about the outbreak of COVID-19, 45.6% reported that they are trying to be calm and relax, 22.13% showed anxiety, 16.60% showed stress, 12.56% showed fear and apprehension, and 3.56% reported no reaction. For reduction of stress, participants also reported doing the following activities: prayer, talk to GOD, and strengthen religious beliefs with 34.45%, housework (cooking and baking bread and cookies) and doing art and handicrafts with 20.80%, and the expansion of virtual communication with family, friends, and relatives with 11.98%. For spending free time with the children, parents also reported the following activities: planning intellectual and group games and competitions at home with 73%, monitoring school assignments and playing the role of teacher for children with 8.52%, experience a variety of cooking and confectionery for them with 7.01%, and playing virtual and computer games with 5.87%.

The descriptive statistics including mean and SD in **Table 1** show the scores of parents in well-being, MS, and PB according to gender and time periods, the level of education, and have or not having paid professional activities.

### The Effect of Home Quarantine and Gender on MS, PB, and Well-Being

In testing Hypothesis 1, the analysis of variances in **Table 2** showed that the effect of home quarantine was not significant on MS,  $F(1,211) = 1.32, p > 0.25, \eta^2 = 0.006$ , and PB too,  $F(1,211) = 0.26, p > 0.61, \eta^2 = 0.001$ .

**Table 2** also shows that the interactive effect of home quarantine and gender was not significant on MS,  $F(1,211) = 0.13, p > 0.72, \eta^2 = 0.000$ , and PB,  $F(1,211) = 0.71, p > 0.49, \eta^2 = 0.003$ . **Figure 1** shows the effect of home quarantine across the genders.

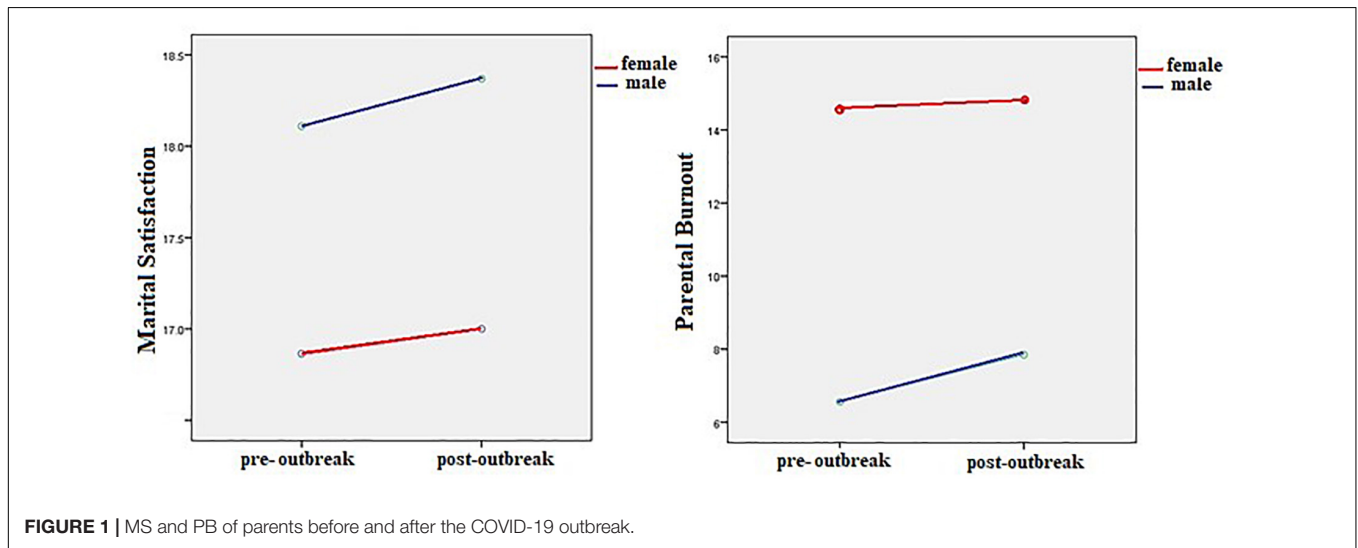
In examining Hypothesis 3, after controlling the effect of pre-prevalence, the result in **Table 2** also revealed that the gender effect for both of the two variables MS,  $F(1,211) = 5.6, p < 0.02, \eta^2 = 0.26$ , and PB,  $F(1,211) = 7.8, p < 0.006, \eta^2 = 0.36$ , was significant. The mean comparison in **Table 1** showed that the fathers ( $18.37 \pm 3.56$ ) have reported more MS than the mothers ( $17 \pm 4.38$ ) and lower burnout ( $1.03 \pm 1.23$ ) than the mothers ( $1.52 \pm 1.53$ ). The ANOVAs showed that gender has a significant effect on well-being too,  $F(1,211) = 7.82, p < 0.01, \eta^2 = 0.19$ . A comparison of the means of the two groups of mothers and fathers in **Table 1** shows that the mothers ( $15.76 \pm 5.41$ ) reported poorer well-being than the fathers ( $17.93 \pm 5.34$ ).

**TABLE 1** | Mean and SD of wellbeing, marital satisfaction and parental burnout according to gender, education, and job before and after home quarantine.

	Gender						Education						Job					
	Mothers (N = 140)		Fathers (N = 73)		Total (N = 213)		Up to graduation of high school (N = 44)		Bachelor (N = 73)		MA/MS (N = 64)		Ph.D. (N = 32)		With paid (N = 139)		Not paid (N = 74)	
	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)
Wellbeing	15.76 (5.41)	17.93 (5.34)	17.05 (5.9)	17.07 (5.9)	16.50 (5.47)	17.05 (5.9)	17.05 (5.9)	15.68 (5.81)	16.66 (5.3)	16.98 (5.3)	16.66 (4.31)	17.29 (5.43)	15.01 (5.29)					
Marital satisfaction	16.86 (4.008)	18.11 (3.7)	17.29 (3.93)	17.07 (4.49)	17.47 (4.16)	17.07 (4.49)	17.07 (4.49)	17.38 (4.42)	18.47 (2.7)	17.19 (3.82)	18.47 (2.7)	17.69 (3.58)	16.54 (4.48)					
Parental burnout	1.54 (1.51)	1.03 (1.23)	1.33 (1.47)	1.3 (1.62)	1.35 (1.46)	1.27 (1.55)	1.27 (1.55)	1.58 (1.51)	1.11 (1.25)	1.07 (1.29)	1.24 (1.44)	1.16 (1.42)	1.67 (1.51)					

**TABLE 2** | Analysis of variance of MS and PB before and after COVID-19 outbreak.

	Source of variation	SS	df	MS	F	p	$\eta^2$
Marital satisfaction	<b>Between subjects</b>						
	Gender	164.07	1	164.07	5.6	0.02	0.26
	Error	6184.32	211	29.31			
	<b>Within subjects</b>						
	Home quarantine	3.76	1	3.76	1.32	0.25	0.006
	Home quarantine * gender	0.37	1	0.37	0.13	0.72	0.001
Parental burnout	<b>Between subjects</b>						
	gender	28.86	1	28.86	7.8	0.006	0.36
	Error	780.92	211	3.7			
	<b>Within subjects</b>						
	Home quarantine	0.17	1	0.17	0.26	0.61	0.001
	Home quarantine * gender	0.32	1	0.32	0.71	0.4	0.003
	Error	96.26	211	0.456			

**FIGURE 1** | MS and PB of parents before and after the COVID-19 outbreak.

## Additional Analysis With Demographic Factors

The results showed that there was no significant relationship between the *length of marriage* and well-being ( $r = -0.05$ ,  $p > 0.4$ ) and PB ( $r = -0.09$ ,  $p > 0.19$ ), but a significant negative relationship with MS ( $r = -0.15$ ,  $p < 0.02$ ). The results showed that there was no significant relationship between the number of children and well-being ( $r = 0.10$ ,  $p > 0.1$ ) and PB ( $r = -0.09$ ,  $p > 0.1$ ) and MS ( $r = -0.005$ ,  $p > 0.9$ ). In addition, no significant relationship was observed between parents' *age* and well-being ( $r = 0.04$ ,  $p > 0.6$ ) and PB ( $r = -0.1$ ,  $p > 0.7$ ) and MS ( $r = -0.09$ ,  $p > 0.1$ ).

The results of ANOVAs showed that parents were not significantly different in terms of *education* in well-being  $F(3,209) = 0.86$ ,  $p > 0.5$ ,  $\eta^2 = 0.012$ , MS  $F(3,209) = 1.53$ ,  $p > 0.2$ ,  $\eta^2 = 0.021$ , and PB  $F(3,209) = 1.51$ ,  $p > 0.2$ ,  $\eta^2 = 0.021$ ; but in terms of *job*, parents having a paid profession had higher scores on well-being  $F(1,211) = 8.7$ ,  $p < 0.004$ ,  $\eta^2 = 0.4$  and MS  $F(1,211) = 6.89$ ,  $p < 0.009$ ,  $\eta^2 = 0.3$ , but did not differ

significantly in PB  $F(1,211) = 3.57$ ,  $p > 0.06$ ,  $\eta^2 = 0.017$  rather than those not having a paid profession. In terms of *neighborhood* welfare, parents were significantly different in the scores of well-being and PB, the results showed that parents living in average neighborhood reported higher well-being than parents living in disadvantaged neighborhood ( $\Delta M = 4.47$ ,  $p < 0.04$ ), parents living in prosperous neighborhoods reported the highest scores in well-being compared with the other two groups ( $\Delta M = 6.8$ ,  $p < 0.002$ ), and parents living in prosperous neighborhoods reported lower scores on PB than parents living in average neighborhoods ( $\Delta M = -0.69$ ,  $p < 0.03$ ).

## DISCUSSION

Crises caused by epidemics lead to many psychological reactions in individuals. The coronavirus epidemic caused by acute respiratory syndrome, which has spread to many Asian, European, and American countries, has become a global public health concern. The disease has affected many people so far and

has led to the death of a number of people in each country, depending on the health facilities and financial and supportive resources; due to the possibility of recurrence and lack of vaccines or definitive drugs for treatment (so far), the only mechanism is restricting the social interactions of people, which led to many closed centers, in addition to severe disruption in the economy and negative psychological outcomes in people around the globe.

The current study was administrated to examine the effect of the outbreak and home quarantine on psychological well-being, PB, and MS of Iranian mothers and fathers. The results showed that home quarantine did not have a significant effect on PB. Although studies in the field of PB are still in their infancy, some of these studies have shown that negative life events, increased environmental demand, problems due to poverty, unemployment, and low economic status, and stress, such as lack of physical and mental health of children and parents, can predict parental exhaustion (Blanchard et al., 2006; Norberg, 2007; Mikolajczak et al., 2018b). Accordingly, the finding of this study is not consistent with these studies. Iranian society is a family-based society in which many sources of support come from the family. Hence, many individual and interactive outcomes can be explained and interpreted in the context of the family. According to the parents' answers to the open questions, it can be seen that the parents for leisure time during the quarantine period provided different activities, such as planning intellectual and group games and competitions at home and playing the role of coach for children as compensation for absence at school; such activities have involved children in various activities, so, staying at home instead of threatening seems to provide a good capacity to pay more attention to housework and children.

Despite the insignificance of the interaction between home quarantine and gender, we can still see an increase in the average scores of fathers in burnout compared with mothers after the outbreak of the disease and staying at home. The presence of fathers at home and their involvement in the performance of household chores and children, although an opportunity to reduce the pressure of permanent and pre-defined parenting and housekeeping duties for mothers and also compensates for the lost educational opportunities of the children, but due to the lack of experience of fathers being at home so much and the division of such responsibilities for them in home quarantine conditions, led to the exhaustion of the fathers; this can be a matter of concern, especially in traditional cultures, such as Iran, where traditional gender roles are defined and accepted for men. The findings by Mangiavacchi et al. (2020) also showed that the closure and lockdown, by restricting the taking of the children to nursing centers, has led to positive changes in the involvement of fathers in caring and educational tasks of children at home and increasing children's well-being. Such involvement of fathers has also been seen, given the distribution of gender roles in European countries, such as Italy (Barigozzi et al., 2020).

The results also showed that the home quarantine does not have a significant effect on MS. This finding is inconsistent with the results of some studies based on the effect of external stress on MS reduction (Maltas, 1992; Neff and Karney, 2009, 2017; Randall and Bodenmann, 2009; Chi et al., 2011). New studies

on the effects of coronavirus and lockdown outbreaks on family interactions have shown that the lockdown has weakened the marital interactions by increasing the rate of unemployment and reducing access to financial resources (Coibion et al., 2020), especially in troubled couples (Perez-Vincent et al., 2020). The findings by Kevin and Rislá (2020) indicated the association between low income and reduced MS, especially in distressed couples. Other findings of this study showed that parents having a paid profession and are living in prosperous neighborhoods reported higher MS and well-being and lower PB. On the other hand, MS as a couple's perception of the multidimensions of marital life and the perceived benefits of a long-term relationship was formed over months and years of communication and affected by different factors, such as life skills, understanding and intimacy, and the feeling of security in the relationship, and so on (Fincham and Beach, 1999; Baumeister and Vohs, 2007). Couples with well-functional interactions support each other and use dyadic coping strategies in coping with external sources of stress (Randall and Bodenmann, 2009), as well as problem-solving techniques and marital life management skills as dyadic coping behaviors have shown a moderating role in the effects of the stressful events on marital quality (Cohan and Bradbury, 1997; Li and Wickrama, 2014). Despite the limitation of the current study in collecting data from distressed couples, an increase in the MS scores of mothers and fathers in the period of post-outbreak rather than pre-outbreak is important, although this difference is not significant, considering the family-oriented culture of Iran, it is important to pay attention to the impact of couples' participation in household chores and parenting responsibilities on MS (Rhyne, 1981; Korja et al., 2016; Liu and Wu, 2018; Leung, 2020; Yoo, 2020). In contextual explanation, as described in the descriptive analysis, engaging of parents in different activities, such as art and household activities, the extending of virtual relationships with family and relatives, the strengthening of religious beliefs, and asking help from supernatural powers, etc. can play an important role in reducing the impact of stressful events on family outcomes.

The results also showed that fathers had higher psychological well-being than mothers. Baruch et al. (1987) and World Health Organization [WHO] (2019) reported that women have poorer well-being due to more responsibilities of family based on unequal distribution of roles, as well as feeling less control over life. These studies have shown that mothers experience high stress and anxiety and low well-being due to the pressures of housekeeping and parenting responsibilities and high societal expectations of motherhood (Skreden et al., 2012; Musick et al., 2016; Meier et al., 2018; Nelson-Coffey et al., 2019). Consistent with this finding, another finding of this study showed that the mothers were more burned out than the fathers. Few evidences showed that burnout is higher in mothers or female caregivers than in fathers (Le Vigouroux and Scola, 2018; Lebert-Charron et al., 2018; Mikolajczak et al., 2018b). In many cultures, women play a permanent role in childcare. Excessive and uninterrupted childcare responsibilities, along with other responsibilities in life and trying to being a perfect mother, make them exhausted from parenting tasks, reduce their mental health, and cause emotional

problems (Meeussen and Van Laar, 2018; Sánchez-Rodríguez et al., 2019; Sorkkila and Aunola, 2020).

The finding also revealed that fathers reported greater MS than mothers. This finding is consistent with many studies on gender differences in MS (Rhyne, 1981; Olson et al., 2008; Ogolsky and Bowers, 2013; Beam et al., 2018). Women are more concerned about intimacy than men, have certain standards for being satisfied with their spouses, and are sensitive to relationship problems more than men (Olson et al., 2008; Ayub and Iqbal, 2012).

The present study is one of the few surveys done in a limited time, so it is not possible to study the longitudinal effect of home quarantine (before, now, and after quarantine). Therefore, to overcome this limitation, parents' perceptions of MS and PB in the pre- and post-prevalence period by asking questions in the form of past and present tenses were assessed; conducting the research nearly after 1 month and a half of prevalence and quarantine and its coincidence with the beginning of the New Year in Iran, type of home quarantine and not punished for leaving home, not focusing on living space and the children's age due to focus on the number of children makes the researchers to be cautious in interpreting the findings. Therefore, to study parent-child backgrounds, increase sample size, pay attention to high-risk groups, and those who lost a member of the family to COVID-19 are recommended for further research.

## DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories

and accession number(s) can be found below: <https://osf.io/htu8p/>.

## ETHICS STATEMENT

This research was conducted in accordance with the ethical codes of the Helsinki Declaration on the consent of the participants (in written) and their anonymity in the research.

## AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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# Psychological Symptoms and Behavioral Changes in Children and Adolescents During the Early Phase of COVID-19 Quarantine in Three European Countries

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The coronavirus disease (COVID-19) pandemic forced the home confinement of the majority of population around the world, including a significant number of children and adolescents, for several weeks in 2020. Negative psychological effects have been identified in adults, but research about the impact of this type of social distancing measure on children and adolescents is scarce. The present study aimed to describe and compare the immediate psychological and behavioral symptoms associated with COVID-19 quarantine in children and adolescents from three southern European countries with different levels of restrictions (Italy, Spain, and Portugal). Parents of 1,480 children and adolescents (52.8% boys) between 3 and 18 years old ( $M = 9.15$ ,  $SD = 4.27$ ) participated in the study. An online survey using snowball sampling techniques was conducted during 15 days between March and April 2020, representing the early phase of the quarantine associated with COVID-19 outbreak. Parents answered questionnaires about sociodemographic data, housing conditions, immediate psychological responses during quarantine (e.g., anxiety, mood, sleep, and behavioral alterations), patterns of use of screens, daily physical activity, and sleep hours before and during the quarantine. The results revealed an increase in children's psychological and behavioral symptoms, increased screen-time, reduced physical activity, and more sleep hours/night. Italian children presented less psychological and behavioral symptoms compared with Portuguese and Spanish children. In general, hierarchical multiple regressions revealed that having an outdoor exit in the house (e.g., garden, terrace) contributed to lower levels of psychological and behavioral symptomatology. Future studies are needed to identify family and individual variables that can better predict children and adolescents' well-being during and after quarantine. Recommendations for families and implications for practice are discussed.

**Keywords:** COVID-19, quarantine, psychological symptoms, behavioral symptoms, child habits, housing conditions, children, adolescents

## INTRODUCTION

Evidence regarding experiences from past outbreaks reveals that quarantine can create a substantial strain on the population and create mental health problems [e.g., (1, 2)]. However, most studies have been focused on adult populations and the psychological impact of quarantine on children remains unclear. The worldwide coronavirus disease (COVID-19) pandemic has caused several governments in Europe to determine quarantine and home confinement. However, restrictions have been quite diverse across different European countries, and the impact of these differences on young people's mental health remains unknown. This present public health crisis and the risk of second-wave outbreaks make it urgent to investigate the psychological effects of this type of social distancing measure on children and adolescents, taking into account the different levels of restrictions established in three European countries: Italy, Spain, and Portugal.

Quarantine is a public health measure that includes the restriction of activities or the separation of healthy individuals who may have been exposed to an infectious agent or disease with the aim of monitoring symptoms and ensuring the early identification of cases (3). Throughout Europe, the severity and timing of restriction measures has differed from country to country. The point at which social distancing was enforced occurred at different dates in each country based on the infection curve. Italy, the first European Union nation to put its entire population under quarantine, closed schools on 5 March (24 February in Lombardy), 16 days after the first 50 cases of COVID-19 were reported. On the other hand, Spain and Portugal closed schools on 13 March, 4 and 12 days after the first 50 cases, respectively.

Another important difference pertains the quarantine status. In general, compliance with quarantine may be voluntary or ensured by governmental orders. Italy and Spain ordered mandatory quarantine, whereas Portugal ordered voluntary quarantine (more specifically, a "general duty of home confinement"). More importantly, no studies to date have examined whether mandatory vs. voluntary quarantine has differential effects on psychological outcomes. However, it has been suggested, for example, that the perception that others may benefit from one's situation can help to endure stressful situations and this might be the case for home-based quarantine (2).

Although the employment of lockdown practices is highly necessary to control the spread of COVID-19, public health organizations worldwide have noted the importance of supporting mental and psychosocial well-being during social isolation and restriction of movements imposed to people during quarantine (4). Consistent with these recommendations, studies from previous epidemics and recent research on COVID-19 unequivocally demonstrate the negative psychological impact of quarantine and home confinement in the general population [e.g., (2, 5–8)]. A recent review of evidence indicates several negative psychological effects associated with quarantine, including posttraumatic stress, depression, anxiety, confusion, and anger (2). This review also suggests that quarantine and home confinement may also have long-lasting psychological

effects. Other studies report emotional reactions to social distancing such as fear, isolation, loneliness, and insomnia, highlighting boredom as the greatest emotional disincentive to compliance with quarantine (1).

Experience with previous quarantine outbreaks highlights the results of prolonged quarantine periods in aspects that may indirectly influence mental health, including loss of income during quarantine, loss of job after quarantine, and disturbances in family relationships (1, 9). Some have argued that this type of disease-containment measures could cause tensions within households, inhibiting family rituals, norms, and values, that may contribute to regulate family functioning in times of crisis (1, 10).

Public health organizations and mental health experts have also acknowledged the potential adverse psychological effects of quarantine on children and adolescents [e.g., (11–13)]. Children have unique and specific needs that are disturbed by COVID-19 quarantine that includes not only home confinement but the inability to go to school and interact with peers and teachers (14). However, significantly less evidence exists regarding the psychological impact of quarantine in children and adolescents. One of the few studies concerning this population (10) found that children who had been quarantined exhibited increased rates of posttraumatic stress symptoms compared with children who were not quarantined, indicating that home confinement can be traumatizing to a significant number of children. A recent study conducted in China in February 2020 with children aged 3–18 years concluded that the most frequent psychological and behavioral problems included clinginess, distraction, irritability, and fear of asking questions about the outbreak (12).

Some authors have suggested that stressors such as lengthy confinement, fear of infection, boredom, inadequate information, lack of contact with peers and significant others, and family economic stress, can have even more significant and enduring effects on young people. The lack of personal space at home and other housing conditions can also have a significant impact on the mental health of children and parents based on previous evidence (15). For example, housing conditions, such as small apartments with limited views and indoor qualities, were related to depressive symptoms in a recent original study that investigated the effects of housing environment characteristics on mental health during the COVID-19 lockdown using a large sample of Italian university students (16). In addition, psychosocial stress and lifestyle alterations caused by home confinement could exacerbate the negative consequences on a child's physical and mental health, which may create a vicious circle (12, 17). Children's particular vulnerabilities to trauma (18), adverse events (12), and environmental risks (17) make them an important group to study the negative psychological effects of COVID-19 quarantine. Despite its importance, this topic has been somehow neglected in the literature and young people's reactions during epidemics remains understudied. This is unfortunate given that understanding young people's behaviors and emotions is essential to (1) accurately address their needs and (2) develop contextually relevant material and preventive actions for children and adolescents that may help to protect their mental health during quarantine measures. The abovementioned research indicates that the psychological effect



of quarantine can be long lasting (2), emphasizing the need to ensure that effective mitigation measures are developed as part of the quarantine planning process. Therefore, there is a global and urgent responsibility of parents and governments to guarantee that children and adolescents are protected from the psychological and physical impact of COVID-19 quarantine (17).

## The Current Study

This study aims to compare immediate psychological effects of COVID-19 quarantine in children and adolescents from three southern European countries with different levels of restrictions: Italy, Spain, and Portugal. The specific objectives are (a) to identify differences in sociodemographic variables and housing conditions across countries; (b) to describe child immediate psychological and behavioral alterations (anxiety, mood, sleep, behavioral, feeding, and cognitive alterations) during COVID-19 quarantine and compare across countries; (c) to describe child habits (use of screens, daily physical activity, and hours of sleep) before and after quarantine and explore differences across countries; and (d) to identify explanatory factors for the

psychological and behavioral alterations during quarantine by considering housing conditions.

## MATERIALS AND METHODS

### Participants

Parents ( $M = 42.26$  years,  $SD = 5.92$ ) of a total of 1,480 children and adolescents between 3 and 18 years old ( $M = 9.15$ ,  $SD = 4.27$ ) from Italy ( $n = 712$  from 94 cities), Spain ( $n = 431$  from 84 cities), and Portugal ( $n = 335$  from 94 cities) participated in the study. The majority of respondents were women (87.8%) and reported a monthly family income between 2,000 and 2,999 euros (31.8%). **Table 1** presents the characteristics of the sample and its equivalence by country. No differences were observed across countries with regard to parents' gender and age, monthly family income, and children's gender. Spanish children are younger than Italian children (but with a small effect).

Significant differences (large effect) on housing conditions were reported between participants from the three countries. Portuguese homes are larger (more square meters) than Italian or Spanish homes. Regarding exits to the outside, Italian houses

**TABLE 1** | Sample characteristics and equivalence by country.

	Total ( <i>n</i> = 1,480)	Italy ( <i>n</i> = 712)	Spain ( <i>n</i> = 431)	Portugal ( <i>n</i> = 335)	Test <sup>a</sup>	Effect size <sup>b</sup>
Parents						
Female [ <i>N</i> (%)]	1,299 (87.8)	627 (88.1)	379 (87.9)	293 (86.9)	0.28	–
Age [M (SD)]	42.26 (5.92)	42.38 (6.64)	42.17 (5.32)	42.10 (4.96)	2.68	–
Monthly family income (euros)						
Up to 999	87 (6.6)	33 (5.3)	31 (8.3)	23 (7.3)	14.82	–
Between 1,000 and 1,999	372 (28.2)	164 (26.2)	113 (30.1)	95 (30.1)		
Between 2,000 and 2,999	417 (31.8)	209 (33.4)	98 (26.1)	110 (34.8)		
Between 3,000 and 4,999	343 (26)	169 (27)	106 (28.3)	68 (21.5)		
5,000 or more	98 (7.4)	51 (8.1)	27 (7.2)	20 (6.3)		
The house where you live has [ <i>N</i> (%)]						
Only windows	158 (10.7)	25 (3.5)	77 (17.9)	56 (16.6)	221.39***	0.27
Garden	559 (37.8)	368 (51.7)	77 (17.9)	114 (33.8)		
Terrace	303 (20.5)	151 (21.1)	121 (28.1)	31 (9.2)		
Balcony	416 (28)	141 (19.9)	145 (33.5)	130 (38.6)		
Another exit	44 (3)	27 (3.8)	11 (2.6)	6 (1.8)		
People who live in my house during quarantine [ <i>N</i> (%)]						
They do not leave the house unless they have to buy groceries or other allowed activities	936 (63.1)	463 (65)	254 (58.9)	217 (64.4)	4.59	–
One or both parents still work outside the home	546 (36.9)	249 (35)	177 (41.1)	120 (35.6)		
How many people live in at home during quarantine [M (SD)]	3.94 (0.94)	3.99 (0.97)	3.84 (0.88)	3.98 (0.95)	9.73**	0.007
Square meters home [M (SD)]	131.04 (67.70)	123.14 (62.29)	124.99 (62.86)	152 (78.89)	46.80***	0.03
Children						
Female [ <i>N</i> (%)]	699 (47.2)	351 (49.3)	192 (44.5)	156 (46.3)	2.58	–
Age [M (SD)]	9.15 (4.27)	9.40 (4.46)	8.55 (3.73)	9.42 (4.45)	8.58*	0.006

*M*, mean; *SD*, standard deviation.

<sup>a</sup>Cross-table ( $\chi^2$ ) for categorical variables and Kruskal-Wallis ( $\chi^2$ ) for continuous variables.

<sup>b</sup>Cramer's *V* for multi-categorical variables and Epsilon-squared for continuous variables.

more frequently have gardens than Spanish houses, and houses with a terrace are more frequently found in Spain compared with Portugal. Houses with only windows or a balcony are more frequently noted in Spain and Portugal compared with Italy. Greater than half of the participants (58.2%,  $n = 862$ ) had an outdoor exit. In general, most of the Italian children live in houses with a garden (51.7%), and most Spanish and Portuguese children have a balcony (33.5 and 38.6%, respectively).

The number of people living at home during quarantine is significantly lower in Spain compared with Italy and to Portugal. The frequency of people who do not leave the house (unless they have to buy groceries or other allowed activities) or who still work outside the home is not different among the three countries.

## Procedure

A cross-sectional design was used to assess the psychological symptoms and behavioral changes in children and adolescents during the early phase of the quarantine associated with COVID-19 from parents' perspective. Participants were recruited via social networks, including social media platforms (Facebook, LinkedIn, Instagram) and researchers' acquaintances (e-mail), using a snowball sampling strategy. An online survey was created *ad-hoc* and distributed in each country (via Qualtrics or GoogleForms) and data were collected for 15 days between March and April 2020. Before completing the survey, information about the objectives of the study was provided, and informed consent was requested. Each participant took ~10 min to complete the survey, and no compensation was provided. The study was approved by the Ethics Committees of the authors' institutions.

## Measures

The survey was constructed initially in English and *ad-hoc* for this study and included multiple choice and rating scale questions. The final version was pilot-tested by 10 families with children aged 3–18 years per country. Comprehension was adequate, and no changes were required in the survey.

A general questionnaire included sociodemographic questions (e.g., participant age and gender, marital status, family income, and number of children) and questions about housing conditions (e.g., square meters and outdoor exits) and specifics about the period of quarantine (e.g., number of people living in at home during quarantine).

The questionnaire about children's immediate psychological responses during quarantine ("During the past few days, compared to before quarantine, to what extent have you noticed that your child...") included 10 items related to "anxiety" (e.g., "is worried" and "is afraid of COVID-19 infection"), 6 items related to "mood" (e.g., "is sad"), 5 items related to "sleep" (e.g., "is afraid to sleep alone"), 6 items related to "behavioral alterations" (e.g., "argues with the rest of the family"), 2 items related to "feeding" (e.g., "eats a lot"), and 2 items related to "cognitive alterations" (e.g., "has difficulty concentrating"). Each item had two possible responses (yes or no). Ordinal alpha in the current sample is excellent ( $\alpha = 0.96$ ). Evidences of validity were found between the subscales and measures of anxiety (SCAS-P) and depression (SMFQ-P). Moderate correlations were observed

between depression (SMFQ-P) and mood ( $\rho = 0.39$ ) as well as between anxiety (SCAS-P) and anxiety ( $\rho = 0.46$ ).

The questionnaire about children's habits included items about the patterns of use of screens (e.g., "Before quarantine, how long did your child use screens such as iPads, TVs, mobiles, or computers daily?") and daily physical activity (e.g., "During quarantine, how much time did your child spend daily on physical activity?") before and during the quarantine with six answer options (from "<30 min" to "more than 180 min"). Parents were also asked about the number of hours their children sleep during the weekdays (before and during the quarantine).

## Data Analyses

All calculations were performed using SPSS 26 for Mac. The Kolmogorov-Smirnov test was used to assess the normality of the data. Given the lack of normality in the continuous variables, non-parametric tests were used. Ordinal alpha, which is considered the most appropriate for ordinal items is calculated. Kruskal-Wallis tests were performed to compare continuous variables across countries (Italy, Spain, and Portugal) and Chi-squared tests were used to compare proportions across these groups. Differences were considered statistically significant when the  $p < 0.05$ . Bonferroni corrections applied to  $p$ -values were used to reduce the risk of type I errors *post-hoc* analysis of Chi-squared tests. In cross-tables, Chi-square *post-hoc* tests using adjusted residuals were calculated (19). Epsilon-squared ( $\epsilon^2$ ) was used as an effect size, where small effect sizes ranged from 0.01 to <0.08, medium effect sizes ranged from 0.08 to <0.26, and large effect sizes ranged from  $\geq 0.26$ . Cramer's  $V$  was calculated as a measure of association between multicategorical variables, and interpreted as follows: >0.25 very strong, >0.15 strong, >0.10 moderate, >0.05 weak, and > 0 none or very weak (20).

The Wilcoxon matched-pair signed rank test was used to evaluate change in patterns of use of screens, daily physical activity, and hours of sleep before and during the quarantine within a group. The effect size of the statistically significant differences was estimated using Rosenthal's  $r$ , which is interpreted as follows: 0.10 = small, 0.30 = medium, and 0.50 = large (21). Mann-Whitney  $U$ -test was performed to analyze the relationship between outdoor exit (yes/no) and main outcomes.

Spearman correlations were calculated to analyze the relationship between continuous variables included in the hierarchical regression analyses. To test the association between having more symptoms in these six areas ("anxiety," "mood," "sleep," "behavioral alterations," "feeding," and "cognitive alterations") during quarantine and housing conditions, six separate hierarchical regression analyses were run using anxiety, mood, sleep, behavioral alterations, feeding, and cognitive alterations as dependent variables. Children's sex and age were included in a first step as covariates. Outdoor exit (yes/no), number of people living at home during quarantine, and square meters home were included in the second step as independent variables. Having a garden or terrace was recoded as 1 (= outdoor exit). Options "only windows," "balcony," and "other exits" were coded as 0 (no outdoor exit). Interactions between variables were analyzed in step 3. Continuous variables were mean centered to avoid multicollinearity.

## RESULTS

The present study aimed to compare immediate psychological and habit changes during COVID-19 quarantine in children and adolescents from Italy, Spain, and Portugal. We also intended to identify explanatory factors for the psychological and behavioral symptoms based on housing conditions.

### Immediate Psychological and Behavioral Symptoms in Children During Quarantine Across Countries

**Table 2** presents parents' perception of their children's anxiety, mood, sleep, behavioral, feeding, and cognitive alterations during quarantine and differences across countries. *Post-hoc* analysis revealed significant differences across countries in all dimensions in total scores (small effects) and in almost all specific items that contribute to each dimension (with small and medium effects), which are detailed in **Table 2**.

In general, children from Italy had significantly lower levels of anxiety, sleep, feeding, and cognitive alterations compared with children from Spain and Portugal. Portuguese children presented significantly more mood alterations than Spanish children. Spanish children presented significantly more behavioral alterations than both Italian and Portuguese children.

Of note, approximately one-third of children are restless, nervous, worried, uneasy, and anxious. Additionally, 27.2% are afraid of COVID-19 infection, and Portuguese children are significantly more afraid of infection compared with the other children. Greater than half of the samples are bored (52.2%) and 1/3 feel lonely, especially Portuguese and Italian children. Considering behavioral alterations, >40% of children are irritable (especially the Portuguese and Spanish), and ~1/3 argues with the rest of the family more than before home confinement.

### Children's Patterns of Use of Screens, Daily Physical Activity, and Hours of Sleep Before and During Quarantine

Significant differences were found before and during quarantine in all habits analyzed both in the total sample and in the samples of each country. **Table 3** presents children's patterns of use of screens, daily physical activity, and hours of sleep during weekdays before and during quarantine and differences across countries.

Daily use of screens noticeably increased during quarantine ( $z = -30.34$ ,  $p < 0.001$ ,  $r = 0.78$ ). Before quarantine, most children used screens from 30 to 60 min/day (35.7%), whereas the majority of children had more than 3 h of screen time during quarantine (30.1%). This pattern is roughly the same in all countries (Italy:  $z = -20.33$ ,  $p < 0.001$ ,  $r = 0.76$ ; Spain:  $z = -16.91$ ,  $p < 0.001$ ,  $r = 0.81$ ; Portugal:  $z = -14.90$ ,  $p < 0.001$ ,  $r = 0.79$ ). Differences across countries (medium effect) before quarantine were found only for the use of screens for <30 min; specifically, Spanish children more frequently used screens <30 min/day. However, during quarantine, more differences were noted across countries (see **Table 3** for detailed *post-hoc* analyses); for example, Italian children use screens less

(<30 min or between 30 and 60 min), whereas Spanish children significantly use screens more frequently (between 120 and 180 min).

Regarding patterns of physical activity, large effects were found when comparing changes before and during quarantine, for all the sample ( $z = -25.56$ ,  $p < 0.001$ ,  $r = 0.66$ ) and for each country in particular (Italy:  $z = -16.08$ ,  $p < 0.001$ ,  $r = 0.60$ ; Spain:  $z = -15.45$ ,  $p < 0.001$ ,  $r = 0.74$ ; Portugal:  $z = -12.48$ ,  $p < 0.001$ ,  $r = 0.66$ ). Before quarantine, most children practiced 30 to 60 min of physical activity daily (33.1%). However, in quarantine, most children experienced <30 min of physical activity (53%). Significant differences across countries (medium effects) were also found (see **Table 3**). For example, before quarantine, Spanish children more frequently practiced physical activity between 120 and 180 min. During quarantine, Portuguese children less frequently participated in <30 min of physical activity.

The mean number of hours of sleep during weekdays significantly increased during home confinement for the total sample ( $z = -11.75$ ,  $p < 0.001$ ,  $r = 0.30$ ) and for each country (Italy:  $z = -8.78$ ,  $p < 0.001$ ,  $r = 0.32$ ; Spain:  $z = -3.02$ ,  $p < 0.001$ ,  $r = 0.14$ ; Portugal:  $z = -8.74$ ,  $p < 0.001$ ,  $r = 0.46$ ). Additionally, significant differences (small effects) were found across the countries. Italian children slept significantly less than Spanish and Portuguese children both before and during quarantine. Before quarantine (but not during this period), Spanish children slept more than Portuguese children.

### Housing Conditions and Children's Psychological and Behavioral Symptoms During Quarantine

**Table 4** presents the descriptive statistics and correlations among children's age, housing conditions, and psychological and behavioral symptoms in study. The size of the home (square meters) was unrelated to the outcome variables. Fewer people at home during quarantine were significantly related to having more mood symptoms, and child's age was significantly related to less symptoms of sleep and behavioral alterations. Children who did not have an outdoor exit at home (garden or terrace) were significantly more likely to present anxiety ( $U = 249,292$ ,  $z = -2.13$ ,  $p < 0.05$ ,  $r = 0.05$ ), sleep ( $U = 234,875.50$ ,  $z = -4.59$ ,  $p < 0.001$ ,  $r = 0.11$ ), behavioral ( $U = 244,057$ ,  $z = -2.85$ ,  $p < 0.01$ ,  $r = 0.07$ ), feeding ( $U = 245,348$ ,  $z = -3.28$ ,  $p \leq 0.001$ ,  $r = 0.08$ ), and cognitive alterations ( $U = 251,278.50$ ,  $z = -2.35$ ,  $p < 0.05$ ,  $r = 0.06$ ) during home confinement compared with those who had an outdoor exit. Compared with girls, boys presented significantly increased levels of anxiety ( $U = 97,292.50$ ,  $z = -3.82$ ,  $p < 0.001$ ,  $r = 0.09$ ), mood ( $U = 95,936.50$ ,  $z = -4.11$ ,  $p < 0.001$ ,  $r = 0.10$ ), sleep ( $U = 99,242$ ,  $z = -4.02$ ,  $p < 0.001$ ,  $r = 0.10$ ), behavioral ( $U = 98,791.50$ ,  $z = -3.61$ ,  $p < 0.001$ ,  $r = 0.09$ ), feeding ( $U = 108,639.50$ ,  $z = -2.09$ ,  $p < 0.05$ ,  $r = 0.05$ ), and cognitive alterations ( $U = 103,479$ ,  $z = -3.30$ ,  $p \leq 0.001$ ,  $r = 0.08$ ).

Hierarchical multiple regression was performed to examine whether housing conditions (outdoor exit and number of people at home) predicted children's psychological and behavioral symptoms during quarantine after controlling for the influence

**TABLE 2 |** Differences across countries in children's psychological and behavioral symptoms during quarantine (parents' perceptions).

	Total (n = 1,480)		Italy (1) (n = 712)		Spain (2) (n = 431)		Portugal (3) (n = 335)		Test <sup>a</sup>	Effect size <sup>b</sup>	Post-hoc
	N	%	n	%	n	%	n	%			
<b>Anxiety/Activation</b>											
My child is worried	495	33.4	226	31.7	118	27.4	151	44.8	27.59***	0.13	3 > 2
My child is anxious	446	30.1	146	20.5	179	15.7	121	35.9	63.27***	0.20	3 > 1; 3 > 2
My child is nervous	543	36.7	243	34.1	191	44.3	109	32.3	15.54***	0.10	2 > 1; 2 > 3
My child worries when one of us leaves the house	350	23.6	121	17	130	30.2	99	29.4	33.71***	0.15	2 > 1; 3 > 1
My child is restless	563	38	247	34.7	196	45.5	120	35.6	1434**	0.10	3 > 2; 1 > 2
My child is afraid of COVID-19 infection	403	27.2	164	23	100	23.2	139	41.2	43.26***	0.17	3 > 1; 3 > 2
My child is uneasy	501	33.9	184	25.8	163	37.8	154	45.7	44.54***	0.17	3 > 1
My child is easily alarmed	214	14.5	78	11	60	13.9	76	22.6	25.01***	0.13	3 > 1
My child has physical complaints (headache, stomach ache,...)	193	13	72	10.1	87	20.2	34	10.1	27.37***	0.13	2 > 1; 2 > 3
My child asks about death	202	13.6	102	14.3	53	12.3	47	13.9	0.97	–	–
Anxiety total [M (SD), range = 0–10]	2.64	2.53	2.22	2.38	2.96	2.62	3.11	2.58	40.96***	0.02	2 > 1; 3 > 1
<b>Mood</b>											
My child is sad	351	23.7	189	26.5	77	17.9	85	25.2	11.71**	0.09	1 > 2; 3 > 2
My child is reluctant	345	23.3	192	27	90	20.9	63	18.7	10.76**	0.08	1 > 2; 1 > 3
My child feels lonely	491	33.2	280	39.3	78	18.1	133	39.5	62.36***	0.20	1 > 2; 3 > 2
My child cries easily	261	17.6	97	13.6	98	22.7	66	19.6	16.49***	0.10	2 > 1
My child feels frustrated	328	22.2	113	15.9	100	23.2	115	34.1	44.53***	0.17	3 > 1
My child is bored	772	52.2	383	53.8	213	49.4	176	52.2	2.05	–	–
Mood total (M (SD), range = 0–6)	1.72	1.61	1.76	1.62	1.52	1.50	1.89	1.70	8.71*	0.006	3 > 2
<b>Sleep</b>											
My child wakes up frequently	180	12.2	70	9.8	68	15.8	42	12.5	8.92*	0.08	2 > 1
My child sleeps little	189	12.8	52	7.3	31.3	16.9	64	19	37.52***	0.16	3 > 1; 3 > 2
My child is afraid to sleep alone	253	17.1	94	13.2	103	23.9	56	16.6	21.74***	0.12	2 > 1
My child has nightmares	169	11.4	62	8.7	64	14.8	43	12.8	10.78**	0.08	2 > 1
My child has sleeping difficulties	249	16.8	90	12.6	105	24.3	54	16.02	26.56***	0.13	2 > 1
Sleep total (M (SD), range = 0–5)	0.70	1.21	0.51	1.06	0.95	31.8	0.76	1.21	42.73***	0.02	3 > 1; 2 > 1
<b>Behavioral alterations</b>											
My child argues with the rest of the family	447	30.2	165	23.2	174	40.4	108	32	38.36***	0.16	2 > 1
My child is irritable	598	40.4	260	36.5	186	43.2	152	45.1	8.91*	0.07	2 > 1; 3 > 1
My child has behavioral problems	246	16.6	57	8	128	29.7	61	18.1	91.85***	0.25	2 > 1
My child is angry	388	26.2	157	22.1	139	32.3	92	27.3	14.70**	0.10	2 > 1
My child is very quiet	159	10.7	102	14.3	24	5.6	33	9.8	21.88***	0.12	1 > 2
My child is very dependent on us	394	26.6	163	22.9	157	36.4	74	21.9	30.03***	0.14	2 > 1

(Continued)



TABLE 2 | Continued

	Total (n = 1,480)		Italy (1) (n = 712)		Spain (2) (n = 431)		Portugal (3) (n = 335)		Test <sup>a</sup>	Effect size <sup>b</sup>	Post-hoc
	N	%	n	%	n	%	n	%			
Behavioral alterations total (M (SD), range = 0–6)	1.50	1.61	1.26	1.38	1.87	1.82	1.54	1.68	23.93***	0.01	2 > 1; 2 > 3
<b>Feeding</b>											
My child eats a lot	343	23.2	142	19.9	108	25.1	93	27.6	8.73*	0.07	2 > 1; 3 > 1
My child has no appetite	138	9.3	48	6.7	50	11.6	40	11.9	10.84**	0.08	2 > 1; 3 > 1
Feeding total (M (SD), range = 0–2)	0.32	0.54	0.26	0.49	0.36	0.54	0.39	0.62	14.90**	0.01	3 > 1; 2 > 1
<b>Cognitive alterations</b>											
My child is very indecisive	173	11.7	62	8.7	69	16	42	12.5	14.11**	0.10	2 > 1
My child has difficulty concentrating	353	23.9	135	18.9	133	30.85	85	25.2	21.37***	0.12	2 > 1
Cognitive alterations total (M (SD), range = 0–2)	0.35	0.60	0.27	0.54	0.46	0.66	0.37	0.61	28.95***	0.02	3 > 1; 2 > 1

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

<sup>a</sup>Cross-table ( $\chi^2$ ) for categorical variables and Kruskal-Wallis ( $\chi^2$ ) for continuous variables.

<sup>b</sup>Cramer's V for multi-categorical variables and Epsilon-squared for continuous variables. Bonferroni correction applied to p-values was used to reduce the risk of type I errors post-hoc analysis of a Chi-squared test.

of children's age and sex. Because the square meters of the home did not have a significant correlation with psychological or behavior symptoms, it was not included in the models. As shown in **Table 5**, both the presence of an outdoor exit and the number of people at home were significant predictors of symptomatology. Specifically, having an outdoor exit at home (garden or terrace) was a significant predictor of lower levels of all symptoms, except mood alterations. This was the only significant predictor of lower levels of anxiety, sleep, and cognitive alterations. The number of people living at home was another housing condition with a significant contribution to children's symptoms, particularly mood alterations. These results indicate that the lesser the number of people at home the higher the levels of mood alterations. After controlling for the effects of child age and sex, housing conditions explained between 1.2 and 3.9% of variance. Finally, age and sex were also significant predictors of children's symptoms. To be male was a significant predictor of anxiety symptoms, feeding, and behavior alterations and to be younger was a significant predictor of behavior and sleep alterations.

## DISCUSSION

Despite previous research demonstrating the psychological impact of the imposition of quarantine in past pandemics, few studies have investigated the negative effects on children's and adolescents' mental health. The present study aimed to identify and compare immediate psychological and behavioral effects of COVID-19 quarantine in children and adolescents from Italy, Spain, and Portugal.

## Child Habits and Psychological and Behavioral Alterations During COVID-19 Quarantine

According to parents' perceptions, greater than half of the children feel bored, 40% were irritable, and approximately one-third feels more lonely, restless, nervous, worried, anxious, and uneasy, compared with the period before quarantine. This increase in symptomatology was expected based on past evidence regarding children and adults who experienced previous quarantine outbreaks (2) and recent studies on adults from China during the actual COVID-19 pandemics [e.g., (23)]. Parents also reported that their children argue more with the rest of the family during home confinement. Evidence shows that quarantine has adverse psychological effects on adults' mental health, causing depression, stress, anger, and boredom (e.g., 1,2) and that confinement of people at home can produce tensions within households (1, 10). Considering that parents in COVID-19 quarantine may be particularly distressed, these results might reflect less parental emotional availability to support children, increasing inadequate parenting practices, such as hostility or inconsistent discipline (24, 25). Consequently, children's and adolescents' symptomatology may increase, as well as the probability of arguing with family members. These findings seem to highlight the concerns from international health organizations regarding the impact of COVID-19 quarantine on children and adolescents' mental health and family relationships (4, 26, 27).

Children from the three countries have consistently changed their habits during home confinement, which can also explain the increase in children's psychological and behavioral symptoms. Most children before quarantine used screens (e.g., tablets, TVs, mobiles, computers) <1 h. During home confinement, children

**TABLE 3 |** Children’s patterns of use of screens, daily physical activity, and hours of sleep before and during the quarantine and differences across countries (parents’ perceptions).

Children’s activity patterns	Total (n = 1,480)		Italy (1) (n = 712)		Spain (2) (n = 431)		Portugal (3) (n = 335)		Before quarantine			During quarantine		
	Before	During	Before	During	Before	During	Before	During	Test <sup>a</sup>	Effect size <sup>b</sup>	Pair-wise <sup>b</sup>	Test <sup>a</sup>	Effect size <sup>b</sup>	Post-hoc <sup>b</sup>
<b>Use of screens [min, N (%)]</b>														
<30	306 (20.7)	44 (3) (10.7)	129 (18.1)	32 (4.5) (13.9)	124 (28.8)	7 (1.6)	53 (15.7)	5 (1.5)	30.02**	0.10	2 > 1; 2 > 3	58.92***	0.14	1 > 2; 1 > 3
From 30 to 60	529 (35.7)	158 (10.7)	252 (35.4)	99 (13.9)	151 (35) (37.4)	37 (8.6)	126 (37.4)	22 (6.5)						1 > 2; 1 > 3
From 60 to 90	347 (23.4)	247 (16.7)	173 (24.3)	135 (19)	89 (20.7)	73 (16.9)	85 (25.2)	39 (11.6)						
From 90 to 120	162 (11) (20.7)	307 (20.7)	86 (12.1)	129 (18.1)	39 (9) (12.1)	85 (19.7)	37 (11) (19.7)	93 (27.5)						3 > 1; 3 > 2
From 120 to 180	85 (5.7) (18.8)	278 (18.8)	47 (6.6) (12.1)	101 (14.2)	16 (3.7) (4.2)	104 (24.2)	22 (6.5) (21.7)	73 (21.7)						2 > 1
More than 180	51 (3.5) (30.1)	446 (30.1)	25 (3.5) (30.3)	216 (30.3)	12 (2.8)	125 (29) (31.2)	14 (4.2)	105 (31.2)						
<b>Physical activity [min/day, N (%)]</b>														
<30	189 (12.8)	785 (53) (32.2)	125 (17.6)	404 (56.7)	30 (7) (27.4)	231 (53.6)	34 (10.1)	150 (44.5)	56.43***	0.13	1 > 2	29.29**	0.09	1 > 3; 2 > 3
From 30 to 60	490 (33.1)	477 (32.2)	251 (35.2)	198 (27.8)	118 (27.4)	138 (32) (33.2)	121 (36) (28.5)	141 (41.8)						3 > 1
From 60 to 90	416 (28.1)	138 (9.3)	177 (24.9)	67 (9.4)	143 (33.2)	41 (9.5)	96 (28.5)	30 (8.9)						
From 90 to 120	198 (13.4)	50 (3.4) (11.7)	83 (11.7)	27 (3.9)	67 (15.5)	11 (2.6) (14.2)	48 (14.2)	12 (3.6)						
From 120 to 180	102 (6.9)	16 (1.1) (6.9)	36 (5.1) (11.7)	8 (1.1)	47 (10.9)	4 (0.9) (10.9)	19 (5.6) (14.2)	4 (1.2)			2 > 1; 2 > 3			
More than 180	85 (5.7) (1.44)	14 (1) (1.55)	40 (5.5) (1.56)	8 (1.1) (1.65)	26 (6) (1.16)	6 (1.4) (1.38)	19 (5.6) (1.39)	0 (0) (1.41)						
<b>Hours of sleep/week [M (SD)]</b>														
	9.11 (1.44)	9.51 (1.55)	8.86 (1.56)	9.22 (1.65)	9.44 (1.16)	9.66 (1.38)	9.23 (1.39)	9.91 (1.41)	91.14***	0.06	3 > 1; 2 > 1; 2 > 3	67.31***	0.04	2 > 1; 3 > 1

\*\*p < 0.01; \*\*\*p < 0.001.

<sup>a</sup>Cross-table ( $\chi^2$ ) for categorical variables and Kruskal-Wallis ( $\chi^2$ ) for continuous variables.

<sup>b</sup>Cramer’s V for multi-categorical variables and Epsilon-squared for continuous variables. Bonferroni correction applied to p-values was used to reduce the risk of type I errors post-hoc analysis of a Chi-squared test.

are using screens for more than 3 h, which is definitely higher than levels recommended by international health organizations. For example, the WHO (28) suggests limiting screen time to 1 h for children under 6 years, and diverse studies have revealed associations between screen time and lower psychological well-being among children and adolescents (e.g., 28). In addition, physical activity was reduced in children given that greater than half now practice <30 min. However, before quarantine, children practiced between 30 and 60 min. This level is clearly below the WHO recommendations (28, 29) for at least 180 min of moderate to vigorous physical activity for children under 5 years and at least 60 min for children aged 5–17 years.

On the other hand, the results showed a positive change in children habits during quarantine, indicating an increase in the amount of sleep on weekdays. On average, children are sleeping 9.51 h per night (0.40 h more than before quarantine), which is more in accordance to WHO (28) and American Academy of

Sleep Medicine (30) guidelines (10–13 h of good quality sleep for children under 5 years; 9–12 h for children 5–12 years; 8–10 h for adolescents). However, if this increase in sleep hours is associated with delays in bedtime (frequently related to the use of screen-based activities) (31), it could be problematic. This notion should be explored in future studies.

### Differences Across Italy, Spain, and Portugal

Considering differences of social distancing measures used in the three countries (i.e., mandatory quarantine in Italy and Spain vs. voluntary quarantine/duty of home confinement in Portugal), it was hypothesized that Italian and Spanish children would present higher psychological and behavioral symptoms associated with home confinement compared with Portuguese children. However, Italian children presented less symptoms of anxiety, as well as less sleep, feeding, and cognitive alterations

**TABLE 4** | Means, standard deviations, and correlations with confidence intervals.

Variable	M	SD	1	2	3	4	5	6	7	8
1. Square meters home	131.04	67.70								
2. Number of people at home	3.94	0.94	0.28** [0.23, 0.33]							
3. Child age	9.15	4.28	0.11** [0.06, 0.16]	0.06* [0.01, 0.11]						
4. Anxiety/Activation	2.64	2.53	0.02 [-0.03, 0.07]	-0.01 [-0.06, 0.04]	-0.00 [-0.06, 0.05]					
5. Mood	1.72	1.62	-0.01 [-0.07, 0.04]	-0.07** [-0.12, -0.02]	-0.01 [-0.07, 0.04]	0.54** [0.50, 0.58]				
6. Sleep	0.70	1.21	-0.01 [-0.06, 0.04]	-0.02 [-0.07, 0.03]	-0.17** [-0.22, -0.12]	0.42** [0.38, 0.46]	0.33** [0.28, 0.37]			
7. Behavioral alterations	1.51	1.62	-0.02 [-0.07, 0.04]	-0.00 [-0.05, 0.05]	-0.12** [-0.17, -0.07]	0.61** [0.57, 0.64]	0.59** [0.55, 0.62]	0.40** [0.36, 0.45]		
8. Feeding	0.33	0.54	-0.02 [-0.08, 0.03]	-0.01 [-0.06, 0.04]	-0.01 [-0.06, 0.05]	0.23** [0.18, 0.28]	0.19** [0.14, 0.24]	0.16** [0.11, 0.21]	0.26** [0.21, 0.31]	
9. Cognitive alterations	0.36	0.61	0.02 [-0.03, 0.07]	0.01 [-0.04, 0.06]	-0.02 [-0.07, 0.03]	0.47** [0.43, 0.51]	0.44** [0.40, 0.48]	0.32** [0.27, 0.36]	0.50** [0.46, 0.54]	0.19** [0.14, 0.24]

Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (22).

M, mean; SD, standard deviation.

\* $p < 0.05$ ; \*\* $p < 0.01$ .

compared with the other two groups of children. One possible explanation for this surprising result might be related to the fact that schools in Italy closed 8 days before schools in Spain and Portugal. Given that the data collection period occurred simultaneously in the three countries, the results may indicate that Italian children had more time to adjust to and accept the situation of home confinement and find strategies to cope with it (similar to a grief process) (32). Nevertheless, longitudinal studies are needed to explore this hypothesis. Another possible explanation might be associated with differences across countries in housing conditions and screen time. Greater than half of the Italian children live in homes with a garden, and these children spend less time on screens. On the other hand, although Portuguese children are living in larger houses, most Portuguese and Spanish children do not have outdoor exits, such as gardens or terraces, thus limiting available space for outdoor activities. Taken together, these results may suggest that Italian children are probably having more “quality play time” and engaging in activities that are healthier, screen free and in contact (although restricted) with nature compared with their counterparts, which can contribute to their reduced levels of psychological and behavioral symptoms during quarantine. These findings support studies showing children’s positive outcomes associated with less screen time (33) and indicating that engagement in outdoor activities can play a protective role in terms of young people’s mental health (34, 35).

Another important result pertains to Spanish children who presented more behavioral alterations. In particular, compared with Italians, Spanish children argue more with the rest of the family, have more behavioral problems, are angrier and are more dependent on their parents. These symptoms may be related to modifications in children’s habits during quarantine

given that this group exhibited a higher decrease of physical activity and higher levels of screen time. Previous studies have highlighted the consequences of oversedentary lifestyle and the use of screens by children and adolescents on their psychological well-being, including lower self-control, less emotional stability, more depressive and anxiety symptoms, and being more difficult to care for [e.g., (33, 36, 37)].

In turn, Portuguese children presented more mood alterations than Spanish children (e.g., feeling more lonely, sad, and frustrated) and are more children in this group feeling anxious and afraid of COVID-19 infection. This result is surprising considering that Portugal has adopted a less restrictive quarantine measure compared with the other countries in study. Some possible explanations may account for this finding. First, parental psychopathology (e.g., anxiety, depression) and offspring emotional disorders have been associated in the literature [e.g., (37, 38, 38–40)]. Consistent with this evidence, Portuguese adults present higher levels of psychiatric disorders compared with Spanish and Italian adults (22.9 vs. 9.2 and 8.2%, respectively; (41), and results showed high parental low mood and preoccupation with COVID-19, which seem to suggest the transmission of anxiety and distress from parents to children and/or within family relationships, contaminating children’s mood. Second, these differences might also be related to the Portuguese quarantine status. It is possible that the non-mandatory nature of Portuguese home confinement may be confusing to children and adolescents in the sense that it might expose them to inconsistent situations of social contact (e.g., they might see children playing on the street while are told by their parents that they cannot do it). Future studies should explore these and other possible explanations for these results.

**TABLE 5 |** Results from hierarchical regression examining the association between psychological and behavioral symptoms during quarantine and housing conditions, controlling for children’s sex and age.

Predictor variables	B	95% CI (B)	$\beta$	t statistic	p-value	$\Delta R^2$	Adj.R <sup>2</sup>
<b>DV: anxiety/activation</b>							
Step 1							
Constant	2.76	2.58, 2.94		30.56	<0.001	0.003	0.002
Child sex	-0.26	-0.52, -0.004	-0.05	1.99	0.04		
Step 2							
Constant	2.94	2.71, 3.17		24.82	<0.001	0.006	0.005
Child sex	-0.25	-0.51, 0.001	-0.05	-1.96	0.04		
Outdoor exit	-0.31	-0.57, -0.04	-0.06	-2.32	0.02		
<b>DV: mood</b>							
Step 1							
Constant	1.72	1.61, 1.83		29.79	<0.001	0	-0.001
Child sex	-0.004	-0.16, 0.16	-0.001	-0.04	0.96		
Step 2							
Constant	2.20	1.83, 2.57		11.82	<0.001	0.005	0.004
Child sex	-0.01	-0.18, 0.15	-0.005	-0.17	0.85		
Number of people at home	-0.12	-0.20, -0.03	-0.07	-2.71	0.007		
<b>DV: behavioral alterations</b>							
Step 1							
Constant	2.03	1.82, 2.24		19.14	<0.001	0.019	0.018
Child age	-0.04	-0.06, -0.02	-0.12	-4.76	<0.001		
Child sex	-0.21	-0.37, -0.04	-0.06	-2.54	0.01		
Step 2							
Constant	2.13	1.73, 2.53		10.42	<0.001	0.026	0.024
Child age	-0.04	-0.06, -0.02	-0.12	-4.76	<0.001		
Child sex	-0.21	-0.37, -0.04	-0.06	-2.53	0.01		
Outdoor exit	-0.27	-0.43, -0.10	-0.08	-3.24	0.001		
Step 3: interaction effects							
Constant	2.24	1.69, 2.78		8.04	<0.001	0.028	0.024
Child age * child sex	0.02	-0.03, 0.07	0.06	0.85	0.39		
Child age * outdoor exit	-0.03	-0.06, 0.010	-0.06	-1.45	0.14		
Child sex * outdoor exit	0.05	-0.27, 0.38	0.01	0.31	0.75		
<b>DV: sleep</b>							
Step 1							
Constant	1.14	0.98, 1.30		14.41	<0.001	0.030	0.028
Child age	-0.05	-0.06, -0.03	-0.17	-6.69	<0.001		
Child sex	0.009	-0.11, 0.13	0.004	0.14	0.88		
Step 2							
Constant	1.27	1.10, 1.44		14.71	<0.001	0.038	0.037
Child age	-0.05	-0.06, -0.03	-0.17	-6.70	<0.001		
Child sex	0.01	-0.11, 0.13	0.005	0.18	0.85		
Outdoor exit	-0.23	-0.35, -0.11	-0.09	-3.71	<0.001		
Step 3: interaction effects							
Constant	1.21	0.98, 1.44		10.37	<0.001	0.039	0.036
Child age * outdoor exit	-0.01	-0.04, 0.01	-0.03	-0.75	0.44		

(Continued)



TABLE 5 | Continued

Predictor variables	B	95% CI (B)	$\beta$	t statistic	p-value	$\Delta R^2$	Adj.R <sup>2</sup>
<b>DV: feeding</b>							
Step 1							
Constant	0.35	0.32, 0.39		18.47	<0.001	0.004	0.004
Child sex	-0.07	-0.12, -0.01	-0.06	-2.52	0.01		
Step 2							
Constant	0.41	0.36, 0.46		16.25	<0.001	0.012	0.010
Child sex	-0.07	-0.12, -0.01	-0.06	-2.48	0.01		
Outdoor exit	-0.09	-0.15, -0.03	-0.08	-3.30	0.001		
Step 3: interaction effects							
Constant	0.40	0.34, 0.45		13.44	<0.001	0.012	0.010
Child sex * outdoor exit	-0.05	-0.16, 0.06	-0.04	-0.82	0.40		
<b>DV: cognitive alterations</b>							
Step 1							
Constant	0.37	0.33, 0.42		17.39	<0.001	0.002	0.001
Child sex	-0.04	-0.10, 0.01	-0.04	-1.49	0.13		
Step 2							
Constant	0.41	0.36, 0.47		14.68	<0.001	0.005	0.003
Child sex	-0.04	-0.10, 0.01	-0.04	-1.47	0.14		
Outdoor exit	-0.07	-0.13, -0.007	-0.06	-2.19	0.029		

Categorical variables: child sex (0 = male/1 = female) and outdoor exit (0 = no/1 = yes).

DV, dependent variable; B, unstandardized regression coefficient; CI, confidence interval;  $\beta$ , standardized regression coefficient; t, obtained t value for each predictor variable; p, probability;  $\Delta R^2$ , proportion of variance explained; Adj.R<sup>2</sup>, adjusted proportion of variance explained.

## Housing Conditions Predict Children's Psychological and Behavioral Symptoms During COVID-19 Quarantine

Our findings suggest that housing conditions, including having an outdoor exit such as a garden or terrace, and the number of people living at home, predicted children's psychological and behavioral symptomatology during COVID-19 quarantine. The results showed that having an outdoor exit in the house contributed to lower levels of all symptoms analyzed, except mood alterations. These findings are consistent with previous studies demonstrating that housing characteristics have a direct impact on people's well-being and mental health in general (42, 43), children's development and psychological health in particular [e.g., (44)], as well as young adults' mental health during COVID-19 lockdown (16). Evans et al. (15) argue that housing is not only a physical shelter but also a significant mental health and well-being resource. Having an outdoor exit might mean that children have more space to play freely in the house or direct contact with nature (in the case of houses with garden) and increases visual exposure and access to neighbors, thus elevating social contact (15). This feature is particularly important in a situation of home confinement and restriction of movements, promoting psychological well-being. In turn, not having these types of housing conditions may exacerbate the feeling of social isolation associated with being quarantined. This notion is consistent with evidence suggesting that families living in multiple-dwelling units experience more

social isolation and lack of access to play spaces, thus keeping children inside apartment (15, 42). In accordance with previous evidence (15), the existence of possible underlying mechanisms that may account for the link between housing conditions and children's psychological symptoms but were not investigated in this study should be considered. Having more access to play space provided by outdoor exits may also promote more opportunities for parent-child positive interactions, facilitating more adequate parenting practices (less restrictive and less rigid control over children's activities) which is particularly important to foster children's psychological well-being in times of family stress such as COVID-19 quarantine.

Findings also showed that the number of people living at home contributed significantly to children's mood alterations. A possible explanation for this finding of the "the more the merrier" may be that in times of quarantine, where children have so few opportunities for social interaction and are deprived from contact with peers, interaction with siblings acquires an even greater importance in terms of psychological well-being. This relationship may act as a buffer against the stress caused by quarantine by providing playful interactions and a peer to whom to ask for help if needed, subsequently mitigating mood swings. This result adds to evidence demonstrating the importance of siblings relationships for children's and adolescents' well-being and mental health (45, 46).

Child sex and age also contributed significantly to children's psychological symptomatology. Being a boy predicted behavioral

and feeding alterations, which is consistent with studies demonstrating that boys present higher levels of externalizing behaviors compared with girls (47). However, being a boy also predicted higher levels of anxiety symptoms, which is contrary to most of the studies that show higher prevalence of internalizing disorders among girls compared with boys (e.g., 46). Considering evidence demonstrating gender differences in physical activity levels, whereby boys are generally more physically active than girls (48, 49), these findings indicate that boys under quarantine are especially prone to develop diverse symptoms and behavioral alterations probably due to the restriction of movements and lack of opportunities to participate in physical activity that prevent boys from satisfying their developmental needs for physical activity. Actually, when compared with girls, boys presented higher levels of all studied symptoms. On the other hand, being younger also predicted behavior alterations as well as sleep changes, suggesting that younger children may be more vulnerable to the effects of home confinement. This finding is consistent with studies showing that young children are particularly vulnerable to stressful events (12) probably due to their needs of physical mobility and limited cognitive capability to understand the quarantine situation, as well as guidelines from international health organizations regarding young children responses to stress (50).

## Limitations and Implications for Future Studies

Some limitations of the present study should be mentioned. First, the cross-sectional nature of the study does not allow conclusions on cause-effect relationships, and the recruitment conducted through social networks with snowball sampling may have caused bias. Longitudinal studies and with representative samples will be crucial to deeply understand the real consequences of home confinement during COVID-19 pandemics. Second, this study relies on parent's perceptions about their children's psychological and behavioral alterations during quarantine. Parents' own level of distress may interfere with their perceptive capacities regarding children's functioning. In this sense, future studies should be based as much as possible on the report of the children and adolescents themselves regarding their home confinement experience. Because this experience and its consequences on mental health and well-being should differ according to the level of maturity of the individuals, future studies also need to compare different age groups in children and adolescents. Furthermore, it is necessary to identify and study other variables that may explain the higher levels of psychological and behavioral symptoms of children and adolescents (e.g., coping strategies, amount and quality of information about COVID-19) (17) given that the variance explained by hierarchical multiple regression models was very small. Future studies should also explore possible mediating variables related to parents or family environment (e.g., parental stress, number of hours working from home) that may diminish parental availability and attention as well as parental capacity to manage offspring difficulties and needs.

## Implications for Practice

It is essential that professionals and families are aware that being in home confinement is a hard, strange, and stressful situation for children and adolescents. It is expected that emotional and behavioral changes will occur as a way of expressing the difficulty in understanding, accepting, and adjusting to the situation. In addition, it is expected that most children return to their typical functioning provided that adequate routines and healthy habits are maintained during quarantine and children can receive consistent support from responsive caregivers (51, 52). However, some children may need psychological support after quarantine, especially those with previous psychological or development problems or those with parents struggling with mental problems or economic instability (51). To detect risk situations derived from the pandemic and home confinement (using validated multi-informant and multiproblem approaches), integrative intervention protocols are considered essential during and after home confinement (52).

Similarly, indicated preventive actions are absolutely crucial for the period after home confinement (e.g., at schools), which will allow the early detection of at-risk children, timely mitigation of the effects of a stressful situation for children and adolescents, and the reduction of mild symptoms before their aggravation (52).

Finally, because parents' and children's symptomatology are significantly related, specifically after pandemic disasters (10), and may have deleterious effects on parenting and family relationships, the identification of anxiety, depression, or posttraumatic stress disorder in children should lead clinicians to suggest screening parents' mental health.

## Recommendations for Families With Children and Adolescents

Emotional and behavioral changes are expected reactions in response to completely new situations for children and adolescents, such as being bored, lonely, irritable, uneasy, and worried, or having nightmares. It is therefore essential to pay particular attention to parenting practices at this stage, including adopting an even more authoritative discipline, talking to children about the situation using reliable and appropriate information for the child's age, and showing empathy with regard to their emotions, concerns, and frustrations for the losses that the pandemic is causing in their lives (e.g., being with friends, school routine, sport activities). It is important to set aside time to play with children, especially the smallest ones, increasing physical activity at home, for example, carried out with the family.

Children need structure, so it is essential to maintain rules and routines but also to create new "quarantine routines." It could be helpful create a flexible but consistent daily routine, including time for schoolwork and chores in which children could participate, a specific bedtime and wake-up time, and playtime with and without the family. It is important that children and adolescents can use their phone to connect with friends,

compensating for the absence of face-to-face interactions. However, they should also have technology-free time.

To compensate for the lack of space for outdoor activities (especially for those who do not have houses with gardens or terraces), it is important to engage in family activities and games that increase positive parent-child interactions and physical activity and consequently avoid excessive screen-time increases. As stated by Wang et al. (17), “with the right parenting approaches, family bonds can be strengthened, and child psychological needs met.”

Finally, it is also important that parents also monitor their own behavior and adopt self-care behaviors given that children’s and adolescents’ adaptation and coping with this situation is largely mediated by the role of parents and other relevant social agents (52).

## CONCLUSION

Our study contributes to an emergent body of literature regarding the adverse psychological outcomes associated with COVID-19 quarantine on children and adolescents, consequences that remain uncertain in a population still understudied in the field of pandemic research. The psychological stress as well as individual and family patterns’ alterations imposed by home confinement interact with housing conditions, contributing to detrimental effects on children’s and adolescents’ physical and mental health. Primary and secondary prevention measures are urgently needed to mitigate these effects; otherwise, they can be long lasting and negatively influence youth development.

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## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of Católica Research Centre for Psychological, Family and Social Wellbeing; Ethics Committee of Miguel Hernandez University; Ethics Committee of Università degli Studi di Perugia. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

RF designed the Portuguese survey, collected data, and wrote the draft of this article. MP collected data and wrote the draft of this article. ED designed the Italian survey and collected data. JE designed the study. AM managed and analyzed data. CM collected data. MO designed the study and the survey. All the authors reviewed the draft and contributed to the final version of the manuscript.

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# Anxiety Severity, Perceived Risk of COVID-19 and Individual Functioning in Emerging Adults Facing the Pandemic

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The COVID-19 pandemic is showing a strong impact on people in terms of uncertainty and instability it has caused in different areas of daily life. Uncertainty and instability are also emotions that characterize emerging adulthood (EA). They generate worries about the present and the future and are a source of anxiety that impacts negatively on personal and interpersonal functioning. Anxiety seems a central effect of the pandemic and recent studies have suggested that it is linked to COVID-19 risk perception. In the present study, a sample of 1045 Italian emerging adults was collected: (1) to assess anxiety severity and perceived risk related to COVID-19 and their association and (2) to compare general health and protective factors such as attitudes about security, relationships, self-esteem, and self-efficacy across anxiety severity and perceived risk categories. The findings of this study highlighted that anxiety severity categories were distributed homogeneously across the sample and that half of the participants referred to moderate-severe anxiety. A series of analysis of variances and *post hoc* comparisons showed that general health and all protective factors decreased according to anxiety severity. They were higher in participants with high perceived risk, with the exception of self-efficacy. Given the challenging features of the pandemic and EA, it is crucial to monitor anxiety severity in order to prevent last longing effects on mental and physical health, as well as keeping emerging adults informed about the risks related to the pandemic. Intervention and supportive programs based on improving self-esteem and self-efficacy, as well as confidence in relationships, should be offered to emerging adults over the long term, beyond the current outbreak.

**Keywords:** anxiety, emerging adulthood, instability, isolation, quarantine, risk perception, SARS-CoV-2

## INTRODUCTION

The Coronavirus disease (COVID-19) (WHO) is a respiratory infection caused by a novel coronavirus named 2019-nCoV or SARS-CoV-2 or HCoV-19 (Jiang et al., 2020). In the beginning, it was identified in China where it caused an epidemic that started in December 2019 (Wu et al., 2020; Zhou et al., 2020), since which time its incidence has increased exponentially. Within months, it was declared a global pandemic by the World Health Organization. Italy was one of the first

countries hit and one of the most affected by the pandemic in terms of morbidity and mortality (Dong et al., 2020; Johns Hopkins University and Medicine, 2020).<sup>1</sup> The health system in Italy was, at one point, overwhelmed, with full intensive care departments. In response to the growing pandemic of COVID-19, on March 11, and March 21, 2020, the Italian Government imposed a national lockdown and all individuals were quarantined and forced to maintain strict social distancing from other people.

Uncertainty, insecurity, and instability in different areas of daily life including health, work and relationships were common feelings during the pandemic (Germani et al., 2020a). Moreover, they were exacerbated by scant and inconclusive information about 2019-nCoV and its deep social and economic impact (Ornell et al., 2020). Borrowing the title of a recent paper (Briem, 2020), we can say that during “COVID-19. The only certainty is the uncertainty.” Previous research emphasized the negative impact of uncertainty, insecurity, and instability on mental health and psychological well-being (Ornell et al., 2020; Torales et al., 2020). They underlined that uncertainty and the low predictability of COVID-19 personal, social, and financial consequences, are affecting people’s mental health, due to their difficulty to react successfully and satisfactorily to the situation, especially with regard to anxiety management (Jeong et al., 2016; Cao et al., 2020; Li et al., 2020a,b; Li S. et al., 2020; Wang et al., 2020). In a pandemic, fear and insecurity increase anxiety levels in healthy individuals and intensify the symptoms of those pre-existing psychiatric disorders (Shigemura et al., 2020). The number of people whose mental health is affected tends to be greater than the number of people affected by the infection (Reardon, 2015).

Studies among the Chinese general population have found that symptoms of anxiety have shown a higher increase due to COVID-19 (Li et al., 2020a,b; Wang et al., 2020). In one study, about a third of the interviewees reported moderate to severe anxiety, while they reported lower depressive and stress scores (Wang et al., 2020). In another study (Li S. et al., 2020), the most relevant change between before and after the declaration of the outbreak referred to anxiety levels, followed by depression and problems sleeping. Anxiety seems to be the central effect for populations throughout the world during the pandemic, which is raising anxiety levels in many countries (Fardin, 2020; Limcaoco et al., 2020).

However, anxiety is not always negative. It is important to highlight that it might have a positive effect on the preventative health behavior of individuals, which is strictly related to perceived risk (Brewer et al., 2007; Weinstein et al., 2007; Lin et al., 2020). Risk perception refers to people’s evaluation of the hazards that they are exposed to (Cori et al., 2020). An accurate perceived risk is crucial for managing public health risks during a pandemic because it is potentially a strong modifier of the evolution of the epidemic, since it could influence the number of new positive cases (Rogers, 1975; Ferguson, 2007; Cowling et al.,

2010; Ibuka et al., 2010; van der Weerd et al., 2011; Cori et al., 2020; Dryhurst et al., 2020).

Anxiety and perceived risk, require special attention in emerging adults during the COVID-19 pandemic. Emerging adulthood (EA) was defined as the transition period of life from adolescence to adulthood (Arnett, 2000). Because emerging adults have more autonomy than adolescents and can change their lives in terms of work, residence, and relationships, EA is considered an age of identity exploration, a stage in life where there are many possibilities. However, EA is also characterized by instability and it is a very critical period (Arnett, 2000, 2004). Emerging adults are often fraught with precarity and worry about the future (Côté, 2014; Schwartz, 2016). If, on the one hand, psychological well-being can improve during this period (Galambos et al., 2006), many emerging adults are, on the other, more vulnerable to a worsening of the symptoms of anxiety, which can impact negatively on personal and interpersonal functioning (Kessler et al., 2005; Arnett, 2007; Schwartz, 2016). Moreover, EAs engage in more risky behaviors than adults (Nelson and Barry, 2005).

At the beginning of the pandemic, experts and social media emphasized that emerging adults were not so likely to catch COVID-19, which was considered similar to the flu and thought to be a disease of the elderly (Liao et al., 2020). In line with this, in many countries, Italy included, younger people paid less attention than others to COVID-19 (Barari et al., 2020; Van Bavel et al., 2020). The news and the media reported less preventative health behavior in EA, and some people ignored advice that people practice social distancing and stay at home. When the Italian government imposed the national lockdown, specifically in the period March 18–20, Italian emerging adults (aged 18–30) practices significantly less social distancing compared to adults and the elderly and left home for non-essential reasons more often than others. Italian emerging adults reported anxiety levels lower than in other stages of life, suggesting that they had no accurate risk perception (Barari et al., 2020). However, since this time, the findings indicate that the younger population has been increasingly affected by the virus, as well as other aspects related to the pandemic, and measures implemented by the government, and there are reports that younger participants experienced higher levels of anxiety than older participants (Casagrande et al., 2020; Rossi et al., 2020). This result is in line with findings from studies on the Chinese population, which confirmed that after 10–25 days of lockdown, younger participants (<35 years old) reported significantly higher levels of anxiety than older ones (Huang and Zhao, 2020). Anxiety severity and duration predict long-term outcomes and are linked to crucial aspects of psychological functioning in EA. Moreover, Germani et al. (2020a) found that Italian emerging adults reported higher levels of anxiety than the normative sample (Pedrabissi and Santinello, 1989). At the same time, Germani et al. (2020a) showed that Italian emerging adults were aware of the severity of the COVID-19 pandemic and they were worried and concerned about it. This study (Germani et al., 2020a) therefore suggested that after an early phase of the epidemic from which emerging adults seemed to be exempt (Liao et al., 2020), there is a growing number of positive cases and first deaths in youths, the awareness-raising

<sup>1</sup> <https://www.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>

implemented by all institutions and media, and the measures taken to fight the pandemic, have affected Italian emerging adults.

This developmental phase of life can seriously impact general health status, the perception of one's value, a sense of personal competence, and security versus insecurity in relationships (Cozzarelli et al., 2003; Galambos et al., 2006; Arnett, 2016). Self-esteem (Rosenberg, 1965) is an important predictor of healthy development. Low self-esteem predicts poor mental and physical health, income, delinquency, and depression (Trzesniewski et al., 2006; Orth et al., 2009). A secure attitude in relationships is another crucial factor in EA, both in terms of changes in interpersonal relationships that occur in that period and of social cognition development (Lapsley and Woodbury, 2016; Tanner, 2016). In addition, it has a role in successful adaptation, mental health outcomes, and subjective well-being in EA (Bartholomew and Horowitz, 1991; Lopez and Brennan, 2000; Surcinelli et al., 2010; Mikulincer and Shaver, 2012; Marganska et al., 2013; Germani et al., 2020b).

Research has shown that anxiety is related to personal and interpersonal functioning such as general health (Baksheev et al., 2011), secure attitudes in relationships (Ditzen et al., 2008; Riggs and Han, 2009; Surcinelli et al., 2010; Marganska et al., 2013), self-esteem (Riggs and Han, 2009; Keane and Loades, 2017), and self-efficacy (Muris, 2002; Scholz et al., 2002). A secure attitude in a relationship, self-esteem, and self-efficacy, act as protective factors against anxiety related to the pandemic. They allow emerging adults to draw upon inner resources and to ask for help when they need it. Moreover, in general, emerging adults do not seem to have an accurate perception of risk, meaning they do not undertake preventative health behaviors in response to the COVID-19 pandemic (Barari et al., 2020; Van Bavel et al., 2020). This could be related to personal and interpersonal functioning, since perceived risk and protective versus risk behaviors in the spread of infection are associated with self-esteem and self-efficacy (e.g., Golub et al., 2007) as well as to attitudes in relationships (e.g., Feeney et al., 2000).

In light of the above, it is relevant to evaluate anxiety severity and the perceived risk related to COVID-19 among Italian emerging adults. Moreover, it is of interest to test the association between anxiety severity and perceived risk with personal and interpersonal functioning. The present study aimed: (1) to assess anxiety severity and perceived risk related to COVID-19 and their association and (2) to compare general health and protective factors such as secure attitude in a relationship, self-esteem, self-efficacy across anxiety severity categories and perceived risk. It hypothesized that: (1) anxiety severity was higher than normative level and perceived risk related to COVID-19, indicating both a stressful reaction to the quarantine as well as a high risk perception; (2) that perceived risk partially increased according to anxiety severity, highlighting an association between them. However, considering the difference between these constructs, a small-moderate association was expected; and (3) on the one hand, emerging adults' personal and interpersonal functioning becomes worse with anxiety severity, but on the other, it was better with an awareness of perceived risk about the pandemic, suggesting a positive link between high risk perception and personal and interpersonal functioning.

## MATERIALS AND METHODS

### Participants and Procedure

The sample included 1045 Italian emerging adults (aged 18–29; Mn age = 24.18; SD = 3.60) from all over Italy. About 30% of the sample were male, around the same percentage were workers. About a third of participants reported a history of psychiatric/psychological disorders, and a small percentage (6.5%) disclosed a history of chronic physical diseases. **Table 1** reports data on confirmed cases and health behaviors according to the main containment measures.

Participants filled in an online survey form from March 17 to 26, 2020. Data was collected through convenience sampling. The inclusion criteria were: (1) agreed to participate after reading the study description; (2) that they were aged between 18 and 29 years; and (3), that they completed the entire online survey form.

We obtained approval from the Ethics Committee approval from the Department of Philosophy, Social Sciences, and Education, University of Perugia (Italy). Participation was voluntary, anonymous, and no incentive reward was given. All participants were given the option to withdraw at any moment.

### Measures

#### COVID-19 Perceived Risk (PR)

Participants indicated on a five-point scale (from 1 = “not at all” to 5 = “very much”) the risk perceptions to whom they were or could be exposed to, replying to the following questions: In general, how serious do you think COVID-19 is? How much are you worried about being infected with COVID-19? How worried are you about infecting your relatives?). PR was the average score of the three items.

**TABLE 1** | Descriptive Analysis: Percentage of COVID-19 confirmed cases and health behavior and mean ( $\pm$ SD) scores and Cronbach's alpha of the measures analyzed.

	N	%
<b>COVID-19 Confirmed cases</b>		
Participants	0	0
Participants' relatives and/or friends	246	23.5
<b>COVID-19 Health behaviors</b>		
Stay at home	877	83.7
Social distancing	1036	99.2
Better personal hygiene	995	95.6
	<b>Mn <math>\pm</math> Sd</b>	<b><math>\alpha</math></b>
STAI-State	48.53 $\pm$ 12.64	0.94
COVID-19 PR	3.85 $\pm$ 0.69	0.65
RQ-SA	3.99 $\pm$ 1.85	
RSES	29.38 $\pm$ 6.34	0.89
GSE	28.38 $\pm$ 5.15	0.88
GHQ	16.24 $\pm$ 0.62	0.80

STAI, State and Trait Anxiety Inventory; PR, Perceived Risk; RQ-SA, Relationship Questionnaire – Secure Attitude; RSES, Rosenberg's Self-esteem; GSE, General Self-Efficacy; GHQ, General Health Questionnaire.

### State and Trait Anxiety Inventory-Y – State Scale (STAI-Y, Spielberger, 1989)

We used 20 items assessing how prone each participant was to anxiety in a specific moment. All the items were rated on a 4-point Likert scale from 1 (not at all) to 4 (very much so). Total scores ranged from 20 to 80, with higher scores, indicating a higher level of anxiety. Previous studies showed the *State Scale* is a reliable measure with good convergent and discriminant validity (Spielberger, 1989). The Italian version of the STAI-Y State Scale was used (Pedrabissi and Santinello, 1989).

### Relationship Questionnaire – Secure Attitude (RQ, Bartholomew and Horowitz, 1991)

We used a questionnaire asking participants to describe their secure attitude in a relationship, which had the following options: “It is easy for me to become emotionally close to others. I am comfortable depending on others and having others depend on me. I don’t worry about being alone or having others not accept me.” Participants were asked to rate their attitude from 1 (does not describe me at all) to 7 (describes me exactly). The RQ showed adequate psychometric properties (Ravitz et al., 2010). The Italian version of the RQ (Fossati et al., 2007) was administered.

### Rosenberg’s Self-Esteem Scale

Rosenberg’s Self-Esteem Scale (RSES, Rosenberg, 1965) is a 10-item self-report measure for evaluating the self-worth with a 4-point Likert scale from 1 (Strongly Disagree) to 4 (Strongly agree). A higher score indicates higher self-esteem. RSES showed adequate internal consistency and its validity has been demonstrated in different cultures and languages (Schmitt and Allik, 2005). The Italian version of the RSES (Prezza et al., 1997) was used.

### General Self-Efficacy Scale (GSE, Schwarzer and Jerusalem, 1995)

This scale evaluates an individual’s self-efficacy. It is composed of 10 items, scored on a 4-point scale from 1 (not at all true) to 4 (exactly true). The higher the score the higher the self-efficacy. GSE psychometric characteristics have been extensively studied across several countries by Scholz et al. (2002). The Italian version (Sibilia et al., 1995) was used.

### General Health Questionnaire -12 (GHQ-12, Goldberg and Blackwell, 1970)

This questionnaire assesses general and psychological distress through 12 items rated on a 4-point Likert scale from 0 (less than usual) to 3 (much more than usual). Lower scores indicate lower distress and better general health. A previous study showed GHQ-12 as a reliable and valid measure (Werneke et al., 2000). The Italian version of the GHQ-12 (Piccinelli et al., 1993) was used.

### Data Analysis

Descriptive statistics in terms of mean, standard deviation, and percentage were run for describing, anxiety, and PR related to COVID-19. Four categories of anxiety severity were created according to STAI-Y clinical cutoff (Knight et al., 1983): (1)

scores <40 indicate low anxiety symptoms, (2) scores from 40 to 50 indicate mild anxiety symptoms, (3) scores from 51 to 60 indicate moderate anxiety symptoms and finally (4) scores >60 indicate severe anxiety symptoms. Furthermore, two categories of PR were created by using the median (50th percentile).

Internal consistency was calculated based on Cronbach’s alpha. According to Vaske (2008), alpha values between 0.65 and 0.80 are considered “adequate” for scales adopted for research on human dimensions. Pearson correlation was performed to analyze the association between anxiety severity and PR. A series of Univariate Analysis of Variance (ANOVA) were run to compare secure attitudes in a relationship, self-esteem, self-efficacy, and general health across anxiety severity and PR categories, controlling for the potential interaction between them. The effect size was measured using partial eta-squared, in which small, medium, and large effects were 0.0099, 0.0588, and 0.1379, respectively (Cohen, 1988, p. 283). *Post hoc* comparisons with Bonferroni correction were conducted for anxiety severity categories. All analyses were performed using SPSS, release 25 (IBM Corp, 2017).

## RESULTS

Descriptive statistics and the internal consistency of each of the variables were reported in **Table 1**.

Results showed that 17.6% ( $n = 184$ ) of emerging adults referred to severe levels of state anxiety, 25.8% ( $n = 270$ ) moderate levels, 28.4% ( $n = 297$ ) mild levels, and then 28.1% ( $n = 294$ ) reported low levels of anxiety related to COVID-19. Referring to PR, 536 participants (51.3%) were rated as Low PR, while 509 (48.7%) participants were rated as High PR. The Pearson correlation highlighted a positive significant relationship between state anxiety and PR ( $r = 0.255$ ;  $p < 0.001$ ).

The first ANOVA showed a significant main effect of anxiety severity [ $F_{(3,1037)} = 16.72$ ;  $p < 0.001$ ;  $\eta_p^2 = 0.046$ ] and PR [ $F = 6.47$ ;  $p = 0.011$ ;  $\eta_p^2 = 0.011$ ] categories on secure attitude in relationships, while the interaction between them was not significant [ $F_{(3,1037)} = 1.08$ ;  $p = 0.358$ ;  $\eta_p^2 = 0.003$ ]. *Post hoc* comparisons related to anxiety categories are shown in **Table 2** and they indicate that a secure attitude in a relationship was the highest in low anxiety, followed by mild-moderate, and severe anxiety. As shown in **Table 3**, a secure attitude in relationships was higher in the High PR group than the Low PR group.

The second ANOVA showed a significant main effect of anxiety severity [ $F_{(3,1037)} = 116.41$ ;  $p < 0.001$ ;  $\eta_p^2 = 0.252$ ] and PR [ $F_{(1,1037)} = 14.01$ ;  $p < 0.001$ ;  $\eta_p^2 = 0.013$ ] categories on self-esteem, while the interaction between them was not significant [ $F_{(3,1037)} = 0.73$ ;  $p = 0.534$ ;  $\eta_p^2 = 0.002$ ]. *Post hoc* comparisons related to anxiety categories are shown in **Table 2** and they indicated that self-esteem was highest in low anxiety, followed by mild, moderate, and severe anxiety. As shown in **Table 3**, self-esteem was higher in the High PR group than the Low PR group.

The third ANOVA showed a significant main effect of anxiety severity [ $F_{(3,1037)} = 70.91$ ;  $p < 0.001$ ;  $\eta_p^2 = 0.170$ ] on self-efficacy, but not for PR [ $F_{(1,1037)} = 2.26$ ;  $p = 0.133$ ;  $\eta_p^2 = 0.002$ ]. The interaction between anxiety severity and PR was considered



**TABLE 2 |** Univariate Analysis of Variance (ANOVA) for severity anxiety categories with means and standard deviation scores of psychological features and general health status.

	Low anxiety (1)			Mild anxiety (2)			Moderate anxiety (3)			Severe anxiety (4)			$F_{(3,1037)}$	$\eta_p^2$	POST HOC
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>			
<b>Psychological Features</b>															
RQ-SA	294	4.48	1.81	297	4.03	1.83	270	3.86	1.73	184	3.34	1.91	16.72**	0.046	1 > 2 = 3 > 4
RSE	294	33.39	0.32	297	30.00	0.32	270	27.89	0.33	184	24.20	0.41	116.41**	0.252	1 > 2 > 3 > 4
GSE	294	31.33	0.27	297	28.47	0.27	270	27.17	0.29	184	25.30	0.35	70.91**	0.170	1 > 2 > 3 > 4
<b>General Health Status</b>															
GHQ	294	13.26	3.86	297	15.62	3.49	270	17.45	3.53	184	20.22	3.82	147.15**	0.299	1 < 2 < 3 < 4

RQ-SA, Relationship Questionnaire – Secure Attitude; RSES, Rosenberg’s Self-esteem; GSE = General Self-Efficacy; GHQ, General Health Questionnaire. \* $p < 0.01$ ; \*\* $p < 0.001$  indicates significant differences among severity anxiety categories.  $\eta_p^2$  = partial eta-squares in which 0.0099 = small effect size; 0.0588 = medium effect size; 0.1379 = large effect size.

**TABLE 3 |** Univariate Analysis of Variance (ANOVA) for perceived risk about COVID-19 with means and standard deviation scores of psychological features and general health status.

	Low PR			High PR			$F_{(1,1037)}$	$\eta_p^2$
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>		
<b>Psychological Features</b>								
RQ-SA	536	3.93	1.83	509	4.01	1.87	6.47*	0.015
RSE	536	29.36	6.31	509	29.41	6.37	14.01***	0.013
GSE	536	28.58	5.13	509	28.17	5.17	2.26	0.002
<b>General Health Status</b>								
GHQ	536	16.08	4.37	509	16.41	4.37	6.02*	0.006

PR, Perceived Risk; RQ-SA, Relationship Questionnaire – Secure Attitude; RSES, Rosenberg’s Self-esteem; GSE, General Self-Efficacy; GHQ, General Health Questionnaire. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$  indicate significant differences among PR categories.  $\eta_p^2$  = partial eta-squares in which 0.0099 = small effect size; 0.0588 = medium effect size; 0.1379 = large effect size.

negligible due to its effect size [ $F_{(3,1037)} = 2.88$ ;  $p = 0.035$ ;  $\eta_p^2 = 0.008$ ]. *Post hoc* comparisons related to anxiety categories are shown in **Table 2** and they indicated that self-efficacy was the highest in low anxiety, followed by mild, moderate, and severe anxiety.

The last ANOVA showed a significant main effect of anxiety severity categories on general health status [ $F_{(3,1037)} = 147.15$ ;  $p < 0.001$ ;  $\eta_p^2 = 0.299$ ]. The effect of PR was negligible [ $F_{(1,1037)} = 6.02$ ;  $p = 0.014$ ;  $\eta_p^2 = 0.006$ ] and the interaction between anxiety severity and PR was not significant [ $F_{(3,1037)} = 1.33$ ;  $p = 0.261$ ;  $\eta_p^2 = 0.004$ ]. *Post hoc* comparisons related to anxiety categories are shown in **Table 2**. They indicated that general health status was lower (less distress) in low anxiety, followed by mild, moderate, and severe anxiety.

## DISCUSSION

Uncertainty for the future and anxiety are core feelings for both this pandemic (Jeong et al., 2016; Cao et al., 2020; Fardin, 2020; Li et al., 2020a,b; Li S. et al., 2020; Limcaoco et al., 2020; Ornell et al., 2020; Shigemura et al., 2020; Torales et al., 2020; Wang et al., 2020) and the developmental phase of the life that EAs experience (Arnett, 2000, 2004, 2007; Kessler et al., 2005; Côté, 2014; Schwartz, 2016; Germani et al., 2020a). Another crucial feature of EA is the low perception of risk, which leads some

emerging adults to engage in more risky behaviors than adults (Nelson and Barry, 2005). Thus, they could represent one of the main categories of people who are vulnerable to the effects of the pandemic (Casagrande et al., 2020; Germani et al., 2020a; Huang and Zhao, 2020; Rossi et al., 2020). For this reason, the current paper explored emerging adults’ personal and interpersonal functioning taking into account anxiety severity and PR.

Italian emerging adults have reported high perceived risk about the pandemic. They rated it as severe, and they were aware of the elevated risk of being infected and infecting others, although none were directly or indirectly affected by COVID-19 (i.e., through relatives and/or friends). Moreover, their accurate perceived risk helped them in respecting the key containment measures imposed by the government, namely staying at home, maintaining social distancing, and washing hands (Brewer et al., 2007; Weinstein et al., 2007). On the other hand, it is reasonable to assume that those who underestimated the risk and severity of COVID-19, had scant knowledge and awareness of the pandemic or a denial of the risk, probably unconsciously (Cava et al., 2005; Larsman et al., 2012).

About half of emerging adults referred to moderate-severe levels of anxiety, suggesting very high distress. In response to the pandemic, they experienced a strong feeling of insecurity, of powerlessness in the face of perceived damage that can lead either to concern or to flight and avoidance. This finding is in line with previous studies that reported very high anxiety

levels among emerging adults during the pandemic (Casagrande et al., 2020; Cellini et al., 2020; Huang and Zhao, 2020; Lin et al., 2020; Rossi et al., 2020). Specifically, we found an average score very close to the one found by Lin et al. (2020) among Chinese, who assessed state anxiety with STAI-Y. However, Cellini et al. (2020), who administered the short version of the Depression Anxiety Stress Scale which distinguishes normal, mild, moderate, severe, and extremely severe anxiety symptoms during the last week, and found that 32.6% of the sample reported moderate to extremely severe scores. Moreover, Rossi et al. (2020), used the Generalized Anxiety Disorder scale in Italian adults (Mage = 38 years old) and found that 20.8% reported severe anxiety symptoms. Although the number of participants who reported moderate-severe anxiety in the present study is higher than the ones from the aforementioned studies, due to the different questionnaire administered to them and/or the different age range of the participants, it is not possible to compare these results. Finally, anxiety was partly related to risk perception, in line with the literature (Lin et al., 2020), suggesting that it may have a positive effect on preventative health behavior (Brewer et al., 2007; Weinstein et al., 2007).

Personal and interpersonal functioning such as a secure attitude in relationships, self-esteem, and self-efficacy, as well as general health status, were linked to anxiety severity. The higher the anxiety severity, the lower the general health status and protective factors. These strong feelings and responses to the instability and uncertainty caused by the pandemic, seem to be strongly related to a negative model of self and others. In other words, low self-esteem and confidence in relationships were reported by participants with severe-moderate anxiety. The latter and low self-esteem are the main characteristics of the ruminative identity style in EA as well as intrusive thoughts, which expose to depressive symptoms (Crocetti et al., 2011). Attachment is considered a crucial factor for the challenges of EA, changes in the world of interpersonal relationships that take on new significance during EA, social cognition development, and subjective well-being (Arnett, 2016). Self-esteem is an important predictor of healthy development. Instead, emerging adults with positive self-esteem and trust in relationships can face the daily challenges by using their internal sources, as well as by asking for help when they need it (Murray et al., 2000; Germani et al., 2020b). Self-esteem increases from childhood to adolescence and reaches its peak in EA (Bleidorn et al., 2015). Thus, it is of crucial relevance to take this into account as a protective factor during the health emergency. This sense of self-confidence and confidence in others could help them in controlling their anxiety and enable awareness about the severity of the pandemic. It is noteworthy that we found larger effect sizes in the comparison between anxiety categories in self-esteem and general health status than in the other psychological features assessed.

Shifting to perceived risk, positive self-esteem, and a secure attitude in relationships were reported by emerging adults who showed a high PR, namely a more accurate understanding of the situation. In other words, this finding indicates that positive self-esteem and trust in relationships might have allowed emerging adults to fully perceive and feel the severity of the COVID-19 pandemic and preoccupation for risk infection and that a

good and stable general perception of one's-own value, as well as confidence in self and others, are key factors of emotional resilience in this age group.

The limitations of this study are connected to the generalizability of the findings due to the convenience sampling method, the direction of causality between the selected variables because this study is cross-sectional, and the common variance between variables due to the measurement method (i.e., self-report questionnaires). Moreover, the fact that the entire online survey had to be completed before participants were enrolled in the study, could potentially represent a further threat to generalizability.

To conclude, the present study indicated that during the first weeks of the quarantine, Italian emerging adults evaluated the pandemic as severe with a very high risk of infection, showing a realistic perception of the situation. Anxiety was a common feeling during those weeks and its severity was positively associated with perceived risk. Both self-esteem and a secure attitude in relationships seemed to protect EAs emotionally in this context.

This study recommends monitoring emerging adults and their psychological functioning throughout all the stages of the health emergency. COVID-19 has crucially affected emerging adults' work, study, social lives, and caring responsibilities in a time of personal and interpersonal change. The various restrictions have exacerbated both economic and social inequalities. However, the current study underlined that a greater contributory factor to anxiety about this situation is connected to people's ability to understand the severity of the virus. It suggests that it is important to track anxiety severity in emerging adults during the next steps of the COVID-19 pandemic, considering that high and prolonged anxiety exposes them to mental and physical disorders. This study suggests that continuing to keep emerging adults informed about the risks related to the pandemic will promote preventative health behaviors. At the same time, public health and health policy should track anxiety severity and help emerging adults in understanding and accepting the common psychological reactions to COVID-19 without avoiding and/or denying them and the related risks. Finally, mental health interventions such as psychological therapy sessions (i.e., psychodynamically and/or behavioral cognitive-oriented) and supportive programs based on maintaining and improving self-esteem and self-efficacy, as well as confidence in relationships, which aim to help them cope with anxiety related to the pandemic, should be offered to emerging adults over the long term, far beyond the current outbreak.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of the Department of Philosophy,

Social Sciences and Education of the University of Perugia (Italy). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

LB and GG organized the database and performed the statistical analysis. AG and ED wrote the first draft of the manuscript.

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# Bibliotherapy: Reading OVID During COVID

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An epidemic of an infectious disease such as COVID-19 is often a source of emotional distress, even among those who have not been directly exposed to the disease. The period following the acute phase of the coronavirus epidemic and the mitigation measures will likely be hardest for medical professionals in terms of psychological impact. Bibliotherapy is a systematic intervention regarding the use of carefully selected reading materials in order to help persons to cope with stress and personal problems. This therapy can be used easily during the pandemic. The review of evidence shows that this kind of intervention can be helpful in educational and clinical contexts. During the crisis, it can be an alternative to video and film entertainment and a transition from serious medical journal clubs to a softer medical humanities experience. In this article, we summarized the historical background of bibliotherapy. We also proposed a reading list from different times, and cultures relating to pandemic, quarantine, symptoms, confinement, and social impacts (e.g., Camus, Moravia, London, Le Clezio etc.). Bibliotherapy can be a way for doctors and healthcare workers fighting on the frontline of the pandemic to find psychological support and for debriefing. Bibliotherapy can help individuals that need support for emotional distress during the pandemic to verbalize their feelings and emotions and identify new ways of addressing problems.

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## INTRODUCTION

Some of us are in exile, far from our families, trapped and confined, sometimes in quarantine or starting a risky de-confinement (1–3). Remote work is possible. Television is accessible with series and continuous information. And sometimes when we choose television and are tired of counting deaths by country or county, we watch action films. And there, we no longer count the deaths and the machine-gun shots wielded by heroes rescued from so many shots and explosions. So we lean toward reading as a way of healing and not counting anymore. Sometimes, in our exile, we are not lucky to have taken a library in our suitcases with the chosen books and in a familiar language. Fortunately, there are electronic libraries and e-books. And there, we start reading and dreaming. And we are rediscovering Ovid, our alternative to Covid. Ovid, in Latin Publius Ovidius Naso, is a Latin poet who lived during the period which saw the birth of the Roman Empire. He too had to exile or confine himself to an island. The reasons for his exile remain mysterious: the subversive remarks made in “The Art of Loving” is the main reason cited by critics. One of us (ES) was able to find and read it and it was a therapy, a bibliotherapy.

This article emphasizes the importance of bibliotherapy during the COVID-19 crisis. In this article, we propose to reposition bibliotherapy as a means of treating psychological distress, boredom, isolation, and limitations during the pandemic. Bibliotherapy can be a way for doctors

and healthcare workers fighting on the frontline of the pandemic to find psychological support and for debriefing.

Confinement weighs on us and deconfinement stresses us (4, 5). Every book we love is a treasure. A window on a world, fantastic, dream-like, whacky, childish, foreign, from another era, which one then has either jealously stored in their library or carelessly buried in the back of a closet. But some volumes are even more than that. They are talismans, protective cocoons, in which we delve back into delightful times. We re-read them to soften our spleen, soothe our panic, or escape from an everyday life that has become too heavy.

## BIBLIOTHERAPY

Bibliotherapy is a form of clinical or self-developing therapy, often used in connection to psychotherapy, that includes reading as a part of a treatment (6, 7). More specifically, therapeutic reading is a source of appeasement for mental health disorders (namely, anxiety disorders, mood disorders, depressive episodes, phobias, sleep disorders, etc.) or for strengthening psychological well-being (8–12).

In the midst of the First World War, doctors and booksellers at the Alabama Military Hospital in the United States used books to relieve posttraumatic stress disorder for soldiers returning from combat (13). Then, the 1950s marked the proliferation of research on bibliotherapy in a wide variety of fields (nursing, social work, education, etc.), mainly in North America, to which booksellers largely contributed. In 1961, the definition appeared in Webster International: “bibliotherapy is the use of a set of selected readings as therapeutic tools in medicine and psychiatry; and a way to solve personal problems through directed reading.” In the 1970s, experiences multiplied and really rubbed shoulders with the mental health sector in North America and Europe (13). Care through reading applies to the elderly as well as to individuals suffering from eating disorders or childhood disorders. The experiences are numerous but nevertheless *ad hoc* and emanate from localized initiatives, often within hospital libraries. In this context, the trend cannot flourish on a larger scale because no reproducibility has been observed or implemented from one project to another (13).

Three categories of books used in bibliotherapy are identified (14): the classical repertoire (novel, poetry, biography, fiction) which, often by a process of identification, brings better well-being to the patient, and works whose theme is psychology—their approaches are varied; they can describe a current disorder as well as provide information on a specific disorder. These specifically aim to assist readers. There is a fine line between this category and the last, coined as “self-help books,” to be linked to so-called cognitive development publications of personal inspiration, offering a precise methodology to relieve a malaise.

## HISTORY

It was religious texts that came to be the most used literature for early bibliotherapy up until the mid-nineteenth century (15). The

first known organized form of bibliotherapy in clinical settings can be dated back to thirteenth century Egypt where the hospital staff and religious leaders at the Al Mansour Hospital in Cairo read the Quran to their patients in addition to medical treatment (16, 17).

The therapeutic benefit of reading was first identified by the ancient Romans and Greeks and can be found in theories by well-known scholars and thinkers throughout history (17, 18). In “Poetics,” the Greek philosopher Aristotle (384–322 BC) presented the concept of using literature and drama for healing and purification (catharsis) of negative emotions. Later, the philosopher Friedrich Nietzsche (1844–1900) and the neurologist Sigmund Freud (1856–1939) referred to Aristotle’s idea of catharsis when describing how literature can have a therapeutic effect on negative emotions (19). Similar connections between literature and therapy can also be found in the architecture of some of the earliest known libraries. The inscription “The House of Healing for the Soul” was, according to the Greek historian Diodorus Siculus (9–30 BC), written over the entrance to Ramses II library in Thebes, Egypt, around 300 BC (16, 20–23), and the inscription “apothecary of the soul” can be seen in the medieval library of the Abby of St. Gall in Switzerland (20). Inspired by Freud’s work, fairytales, symbols, and myths became a central theme within the Jungian psychoanalytic context in the mid and late twentieth century (22). Key publications such as Carl Gustav Jung’s “Man and his Symbols” (23), Marie Louise von Franz’s “Interpretation of Fairy Tales” (24), and the psychotherapeutic and gender political books “Iron John: A Book About Men” by Bly (25) and “Women Who Run with the Wolves: Contacting the Power of the Wild Woman” by Estés (26) are a few examples of how fairytales and myths can be used for self-development.

In addition, according to some authors, Bibliotherapy can be called developmental bibliotherapy (17, 27), or affective bibliotherapy (28) to differentiate it from cognitive behavioral bibliotherapy (CBT). CBT mainly uses self-help books (9).

## CURRENT RESEARCH AND PRACTICAL FRAMEWORK

In modern clinical or developmental bibliotherapeutic settings, mental health professionals may prescribe selected fiction or non-fiction materials such as novels, short stories, biographies, dramas, tales, fables, and poetry as a part of a patient’s treatment (17). A study by Bruneau and Pehrsson emphasizes the importance of choosing personalized reading materials and encourages bibliotherapists to involve their clients in the selection process as an opportunity to foster self-insight and motivation to read (28). The growing and increasingly popular self-help books are an additional form of bibliotherapy that can be used in conjunction with cognitive behavioral therapy (17). Depression, anxiety (29), posttraumatic stress disorder (30), panic attacks (31, 32), insomnia (33) and stress (34), and strokes and their psychological consequences (35) are some examples of psychiatric and psychological conditions where self-help books have been proven to be helpful.

A study published in PLOS One showed convincing results for the effectiveness of this form of care. The Scottish research team brought together more than 200 patients diagnosed with depression; half were put on antidepressants while the other followed a therapy program through reading the book “Overcoming Depression” and having related discussions with psychologists. At the end of 4 months, 42.6% of patient-readers saw their degree of depression reduce significantly compared to 24.5% of patients on medication. After 1 year, they were more able to manage depression than the other group (36). However, this study was conducted using a guided self-help CBT treatment, whereas our attempt to currently review literature on bibliotherapy is more about another category (mainly the “classical” repertoire such as novels, poetry, and biographies) and not works whose theme is psychology. One of us (ES) used a book, “Address Unknown,” a novella written by K. Kressmann Taylor, to assess the theory of mind and to propose a cognitive remediation for patients with schizophrenia. Simply reading a 20-page novella became a cognitive task, with a good ecological component (37).

Recent studies from Sweden (2020) and Poland (2017) indicate that bibliotherapy can be an efficient complement to therapy and traditional medical interventions (38, 39). However, more clinical studies are needed to support physicians and psychologists with an evidence-based framework for clinical bibliotherapy (10, 29, 34, 39).

Bibliotherapy was originally developed to treat depression. It has also been used among caregivers in recent years (40).

## CAREGIVERS AND HEALTH TEAMS

The effectiveness of bibliotherapy for caregivers has been achieved through a series of different studies. The results of these studies suggested that bibliotherapy was effective in improving the care experiences of caregivers of people with psychosis (40), as well as the resilience of caregivers who care for people with depression (41).

Several studies, including a meta-analysis, using bibliotherapy to improve the mental well-being of caregivers with neurocognitive disorders have also been considered and suggest a favorable effect on their well-being (8, 42).

With new technology and easy access to literature through online libraries and bookshops, bibliotherapy has become an efficient and inexpensive alternative to traditional face-to-face therapy (29). Self-paced reading with follow-up sessions over the phone, videoconferencing, or being in virtual reality settings enables individuals with economic, geographical, physical, or mental barriers to benefit from bibliotherapy (17). The new online or telemedicine options for bibliotherapy have the potential to work very well in pandemic and self-isolation settings.

With the pandemic, overexposure to the stressful news magnifies the feeling of threat, becomes a waste of time, and can even paralyze the individual, preventing them from protective behaviors and facing life demands. Mental health professionals may treat patients with increased emotional distress caused by the

effects of the pandemics on them, on their families, or on their community. Several recent studies highlight the psychological impact of COVID-19 and the need for guidelines and increased psychological interventions (43–45). Depression, anxiety, and insomnia are some examples of psychological distress found among the general population as a result of self-isolation, social distancing, and safety concerns (43–45). The period following the acute phase of the coronavirus epidemic is the hardest for medical professionals in terms of psychological impact (46, 47).

Despite a call for more evidence-based research about the wider effectiveness of bibliotherapy (11, 18, 30, 39, 48, 49), the reported benefits and zero harm makes bibliotherapy an effective form of therapy for individuals with mental and personal development issues (30, 49). Bibliotherapy can be useful for health professionals and physicians. Prescribing a “transitional book” means that the content is part “microbes” and part “magical realism.”

## PROPOSAL: FROM JOURNAL CLUB TO BIBLIOTHERAPY

The information explosion in the pandemic era poses a challenge on how to extract useful resources from a multitude of publications on a daily basis. Doctors and healthcare professionals are bombarded with data. The publication rate is exponential. There are already academic structures for sorting and synthesizing literature. A journal club is an effective approach to tackle these problems; therefore, it has already become an integral part of university education in almost all medical specialties. A journal club is a form of meeting regularly organized between health professionals to discuss related recently published literature. The first organized newspaper club was awarded to Sir William Osler in Montreal, Canada, in 1875, although Sir James Paget described a kind of club among some students at St Bartholomew Hospital in London to read newspapers together between 1835 and 1854 (50). Several decades later, Osler started the first journal club in the United States at Johns Hopkins Hospital in 1889. Over the next 100 years, journal clubs flourished in various medical disciplines in many countries (50).

One of the great challenges of medical education these days is the efficient selection and refinement of relevant literature from a plethora of available information. Journal club formats have evolved over time. However, with this pandemic, physicians, students, and health professional are overloaded and need to find a moment of relaxation where the knowledge can be exposed differently. In addition, exposure to so much data is very heavy. This can be a factor in increasing pressure or stress on mental health. We must arrange different times or ways of doing things to also allow an escape while reflecting on the area around us. The literature-based reading exercise can be an alternative to the austere conference of scientific articles.

The book can be a pretext for sharing experience and novels, comics, and other literary fiction invite you to escape. In these pandemic times, it may be necessary to change or also alleviate the minds of professionals and the public by offering transitional



books, i.e., that concern the subject but allow a distance and a new hedonism in the company of a book.

## POTENTIAL READING LIST

The following are some examples of bibliotherapy that one of us (ES) prescribed to their colleagues:

**The Plague** by Albert Camus has been acclaimed in Italy since the start of the pandemic. In France, sales of this novel have exploded since its appearance. In terms of containment, it ranks among the top 20 best sellers of digital books. “What you learn in the midst of the plagues is that there is more to admire in men than to despise” writes Camus. This novel, which takes place in the 1940s in Oran, Algeria, begins when a strange disease kills very large numbers of rats, then humans. Camus used an allegory to speak of evil, of everything that oppresses us that we have to fight against. This use of allegory means that a 2020 reader can find himself completely and project the coronavirus onto it. The novel lists the multiple reactions of a community to the epidemic: the authorities which are slow to react, the underestimation of the danger, the containment measures, the solidarity which is being put in place but also the profiteers who are getting richer thanks to the black market, etc. Dr. Rieux, the central figure in the novel, reflects the committed, courageous, and generous medical personnel on the front line in the fight against the epidemic. The hero of the story is a modest office worker called Grand. This character would like to write a novel and spends his time repeating the first sentence. At the start of the novel, a journalist called Rambert has only one idea in mind: to join his fiancée who is outside the city. Initially he seeks to flee as someone who today would rather follow his personal desire than obey the common good and accept this confinement which is difficult. Little by little, he will enter the solidarity movement. But as the days go by, he begins to fear that this misfortune will have no end and, at the same time, the cessation of the epidemic becomes the object of all hopes. The end of “The Plague” encourages us not to forget too quickly what we have experienced. Camus reminds us that we must not “forget what we experienced, the unhappiness that happened to us, and everything that has taken place in our capacity to be united in times of trial, to get out of our selfishness.”

**Love in the Time of Cholera.** At the end of the nineteenth century, in a small Caribbean town, Florentino, a poor young telegraph operator and a lovely schoolgirl, swore to marry and live in eternal love. For 3 years they live together, but Fermina marries Juvenal Urbino, a young and brilliant doctor. So Florentino, the betrayed lover, turns into an unrepentant seducer and strives to make a name and a fortune to deserve the one he will never cease to love, in secret, lasting for 50 years, until the day when love will triumph. The analogy proposed by the Colombian writer Gabriel García Márquez between the epidemic and the amorous passion which shakes beings is particularly deep and conducive to reflection. Cholera is not the central subject of García Márquez’s book, published in 1985, 3 years after being awarded the Nobel Prize for literature. Evil, as with Camus, is invisible. It strikes this one or that one, according to its pleasure

and according to the rules of love and chance. But with Camus, the epidemic was a metaphor for war. With García Márquez, it is closer to a loving “passion” that sneaks into the body, nourishes the same symptoms, grows and shakes the body.

**Geopolitique du Moustique** (Mosquito Geopolitics): Following in the footsteps of mosquitoes to write this book, Erik Orsenna has traveled to some of the countries where the diseases transmitted by mosquitoes are rife. In addition to his travels, there are regular visits to the Institut Pasteur in Paris. You only learn about yellow fever there. About 27,500 people died on the two shipyards, French and American, of the Panama Canal between 1882 and 1914, in particular from yellow fever without anyone really knowing what this epidemic was. It was only at the beginning of the twentieth century that we were really able to discern the causes and that the Americans, successors of the French, resolved this problem, both major and unforeseen, which did not exist in Suez. Yellow fever brought its share of corpses every day, and gave the survivors a feeling of precariousness.

**Death in Venice.** At the beginning of the twentieth century, a famous writer wrote an astonishingly topical text in these days of confinement. In his short story *Death in Venice*, Thomas Mann has indeed described the process which leads tourists to be caught in the cracks of which they can hardly root out. Beyond his masterful literary text and his intrigue which sees a writer, Gustav Aschenbach capturing a mad passion for a teenager, he works as a very discerning observer by showing the sneaky diffusion in Venice of what he called “Asian cholera.” Mann’s text helps to see how the epidemic has spread in Europe and particularly in Venice and how it is affecting the city and its people, especially tourists. We complete the list which is not exhaustive in the **Table 1**.

In Japan, Amabie, a legendary creature whose image is supposed to protect against epidemics, has emerged from oblivion since the Covid-19 crisis. In early March 2020, a tweet about this from the Kyoto University Library went viral and triggered an “Amabie-challenge” where many artists began to draw Amabie and publish their works on social networks. This helped foster creativity in a large network, an essential element of resilience.

## CONCLUSION

In this article, we presented the historical background of bibliotherapy and then suggested some books by authors, which can be used independent of culture. Even if reading does not replace a session with the psychologist or therapist, scientific studies have proven the many benefits of reading: it reduces stress, improves the quality of our sleep, and stimulates emotional intelligence. Even if it is rather a solitary activity, reading can really facilitate human relationships by making you more empathetic, provided you feel overwhelmed and transported by the story of the novel you are reading. Reading improves memory and involves memorizing to keep the plot in mind, as well as the names of the characters and their relationships. During this pandemic and in anticipation of several new waves, it is necessary to create strategies and propose concrete therapies favoring groups constrained by social distancing but

**TABLE 1** | A subjective collection of potential books covering topics relevant during times of the COVID-19 pandemic.

<b>Titles</b>	<b>Authors</b>	<b>Themes</b>	<b>Commentaries</b>
The Plague ( <i>La Peste</i> )	Albert Camus	Epidemic Plague	The characters of <i>La Peste</i> are lucky to be able to circulate in Oran, in Algeria during the ongoing plague. Camus reminds us that it's important to have moments when you recharge your batteries and regain your strength at the heart of the plague.
Love in the Time of Cholera	Gabriel García Márquez	Epidemic Cholera	Cholera epidemic forms the backdrop to a doomed love story, with an analogy being made between the epidemic and amorous passion. The cholera randomly strikes at its pleasure like the rules of love and chance, sneaking into the body, and nourishing the same symptoms.
Death in Venice	Thomas Man	Epidemic	The author describes a process which is divided into several stages: 1. Asian origin of the epidemic – > 2. Arrival of the epidemic in Europe – > 3. Identification of the “zero patient” – > 4. Transmission of the epidemic – > 5. Events – > 6. Measures taken by the authorities – > 7. Reactions from the public – > 8. Implications (departure or confinement).
The Perfume	Patrick Süskind	Olfaction	Loss of smell can be the first symptom of COVID. Süskind has put an anti-hero at the center of his action. Ironically, he throws Jean-Baptiste Grenouille, a Parisian orphan, into the world of smells. He can perceive odors from afar and dissect them. He's a stranger with a unique talent and a murderous idea. Grenouille wants to create the largest of all perfumes to finally be part of the world.
Geopolitics of the Mosquito ( <i>Géopolitique du Moustique</i> )	Erik Orsena	Infections Yellow Fever	The precariousness experienced by survivors of Yellow Fever epidemics in the early Twentieth Century is explored and how it incited self-destructive behaviors such as gambling, drugs and prostitution.
Little Women or Meg, Jo, Beth and Amy	Louisa May Alcott	Epidemic Scarlet fever	Scarlet fever is caused by group A streptococcus, transmitted through the air and most often from an affected child (a sore throat, inflammation of the tonsils, and small scarlet red spots). Treatment is based on antibiotics. One child character died from complications which was contracted after she visits the sick children of an impoverished neighbors.
The Lady of the Camellias	Alexandre Dumas	Epidemic Tuberculosis	Climbing the ranks of prostitution in record time, the heroine, passed in a few months from misery to fortune. Pulmonary tuberculosis had a venereal connotation in the nineteenth century. The novel was then adapted for the stage and performed at the Vaudeville theater before inspiring Giuseppe Verdi to play the character of Violetta in <i>La Traviata</i> .
The Masque of the Red Death	Edgar Poe	Epidemic	Poe highlights the principle of the equality of all humans in the face of death. Prince Prospero, the main character favored the knights and ladies of his court who resolved to barricade themselves against the sudden impulses of external despair. This protectionism operated to the detriment of the people kept outside the walls. Poe draws a distinction between masque and mask. Masque as expressing a dance, a masquerade, a farandole composed of masked characters.
The Scarlet Plague	Jack London	Epidemic	Jack London speaks of the carefree people spared by the disease as they watch it spread to other regions, never imagining that it will 1 day reach their own.
The Stand	Stephen King	Epidemic	Stephen King dedicates several chapters of his long novel to the transmission of the virus, by characters who do not know that they are already sick.
Station Eleven	Emily St. John Mandel	Epidemic	The author describes the collapse of our societies in the face of a lightning flu.
The Epidemic ( <i>L'epidemia</i> )	Alberto Moravia	Epidemic	The book is a satirical text on fascism.
The Horseman on the Roof	Jean Giono	Epidemic Cholera	The hero, an Italian hussar from Piedmont, is on the run after winning a deadly duel. His tribulations lead him to Manosque, in Provence, where a cholera epidemic is raging. Pursued by the authorities, who believe him guilty of poisoning the city's fountains, he wanders over the roofs of abandoned houses. Armed with inexplicable immunity and noble devotion, he put himself at the service of a few convicts in the hope of saving them.
The Quarantine ( <i>La Quarantaine</i> )	Le Clézio	Quarantine Smallpox	On a ship, passengers develop symptoms of smallpox. All are forced to land on Flat Island, a volcanic haven in the Indian Ocean, where they will have to remain in quarantine for an indefinite period. Le Clézio reports in <i>La Quarantaine</i> the experience of forced isolation, on an island where colonization separates Europeans from Indian immigrants hired to work in the colonies.
In a Perfect World	Laura Kasischke	Epidemic Influenza	The epidemic story is a tool to paint a vitriolic portrait of the American middle class.
Nemesis	Philip Roth	Epidemic Poliomyelitis	Philip Roth peels at the emotions aroused by the fury of an epidemic.
Peloponnesian War	Thucydide	Epidemic Plague	The plague of Athens devastates Greece and describes the anarchy which is spreading in the city with the disease.
The Last Man	Mary Shelley	Plague Pandemic	The author asks her readers to imagine a world in which only humans are becoming extinct. Attacked by a new, unstoppable plague, the human population collapses within a few years. Other species flourish. A rapidly decreasing band of survivors watches as the world begins to return to a state of conspicuous natural beauty, a global garden of Eden.

(Continued)

TABLE 1 | Continued

Titles	Authors	Themes	Commentaries
A world without female ( <i>Il mondo senza donne, Italian</i> )	Virgilio Martini	Unspecified virus	Conceived in the secrecy of a laboratory, at the beginning of the twenty first century, by a club of American homosexuals who have sworn the disappearance of women, the virus attacks only the weak sex, between puberty and menopause, and mows down its first victims in Haiti. Over time, the demographics are collapsing
All Fools' Day	Edmund Cooper	Radiations Mental illness	Only the eccentrics, the obsessed, creative artist, fanatics of various kinds and psychopaths seem to be immune and survive this mysterious radiation
The Ninth Day ( <i>Le neuvieme jour, French</i> )	Hervé Bazin	Influenza "super-flu"	This describes a society which flirts between the benefits of technical and technological progress and the dangers, which allows a reflection on science and the new role of men
The Eyes of Darkness	Dean Koontz	Unspecified virus	Dean Koontz novel describes a killer virus developed in a Chinese bioweapon lab called "Wuhan-400." First published in 1981 under a pseudonym, the virus, originally produced in Russian, became Chinese in a 1996, post-cold war revision of the book
Plague	Graham Masterton	Epidemic	Department of Public Health support the thesis of the ephemeral phenomenon, but the situation is deteriorating. It is a very contagious fatal disease, the virulence of which is increased 10-fold by an unknown mutation Little by little, the city sinks into chaos. The American authorities use radical methods to contain the epidemic
Pandemic 1918	Catharine Arnold	Pandemic Influenza	Rapid spread of the disease as infected populations were shifted in the wake of the war, the vicious nature of the "second wave" of the disease Spanish flu was that it often struck the healthiest rather than the elderly, young or weak

able to exchange content from a book with a therapist. This review describes bibliotherapy as a means of coping with the extraordinary situation of the COVID-19 pandemic and the associated challenges for mental health. We highlighted that bibliotherapy can be helpful to support people (mainly frontline workers) who are under emotional stress or suffering from mental illness. We provided a historical overview of bibliotherapy and also examples of potential books covering topics relevant to the times of the COVID-19 pandemic.

## LIMITATIONS

The limitation of this article is that it reflects subjective views rather than statistically sound evaluated findings. The literature for the evidence for the efficacy of bibliotherapy is still heterogeneous but is more homogenous in the field of education, school, etc. There are some studies in depression but very few well-controlled studies that often include the bibliotherapy as a part of CBT. A meta-analysis is still possible but difficult at this stage (51–54). For instance, the effects on reducing depression should be still viewed with caution due to high heterogeneity. The effects on other mental well-being outcomes are inconclusive due to limited number of studies, and this underscores the need for further research. The selection of these literary works is also

limited to a certain western culture. It would be necessary to extend it to other cultures, Asian, African, Amerindian etc.

The COVID-19 pandemic is still raging, and it is very likely that, for a relatively long time, we will have to live with it. It is the evolution of the global health situation that will dictate how we operate, its progress, and its possible setbacks. Caution is required in our collective decisions as in our individual behaviors, and the responsibility for each and every one is engaged here. We have listened to science from the start, and that is what we will continue to do in the weeks and months to come. We must also create moments of escape because our physical space to travel is no longer the same. Imaginary trips can be shared, through the literature. Bibliotherapy is a way to structure these trips in order to improve mental health resilience.

Even if containment or social limit measures are in place, technology with ZOOM, MS teams, Blackboard, etc., allows the realization of meetings based on the effects of reading on each of us.

## AUTHOR CONTRIBUTIONS

ES wrote the first version. LÖ and KA reviewed it and added complementary section. All authors contributed to the article and approved the submitted version.

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# Psychological Typhoon Eye Effect During the COVID-19 Outbreak

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**Background:** The COVID-19 outbreak in Wuhan, Hubei, has brought serious consequences to the lives and mental health of people and has induced psychological stress and affected behavior.

**Methods:** This study used self-designed questionnaires and SPSS to analyze the psychological and behavioral responses of people in different regions during the COVID-19 pandemic and to check for the presence of “psychological typhoon eye” (PTE) effects. The questionnaires adopted three measurement subscales, namely, the risk cognitive subscale, stress response subscale, and behavioral response subscale, and these were administered online (www.wjx.cn) to investigate the psychological and behavioral conduct of respondents from three areas that have been affected by COVID-19 to varying degrees. Exploratory factor analysis and principal component analysis were conducted to explore the factorial structure of these subscales, and confirmatory factor analysis was conducted to explore the structural validity of the questionnaires. The analysis results were used to build a revised 18-item questionnaire which validity was evaluated via ANOVA and LSD.

**Results:** Results confirm the presence of PTE in the research areas during the onset of the COVID-19 outbreak and highlight some significant differences in the cognition and emotions of the residents in these areas. PTE affected the cognition, emotions, and cognitive and emotional responses of the respondents but did not affect their behavioral responses.

**Conclusion:** The findings underscore the urgency of providing sustainable mental health care services across different areas during the COVID-19 outbreak. The residents of those areas worst hit by the pandemic, who may not have taken the situation seriously, require emotional guidance the most. Meanwhile, the residents of other areas, who showed the most negative psychological reactions to the pandemic, require a sense of security, a timely “disconnection” from negative information, an accurate cognition of stress, and an acceptance of self-responses.

**Keywords:** COVID-19 epidemic, psychological typhoon eye effect, mental health intervention, psychological stress, self-designed questionnaire

## INTRODUCTION

A new pneumonia infection was reported for the first time in Wuhan, Hubei province, China, at the end of December 2019 (1). On January 12, 2020, the World Health Organization (WHO) temporarily recommended labeling the pneumonia as a new coronavirus: “2019-nCoV acute respiratory disease” (2). On February 8, 2020, the official for China’s National Health Committee issued a notice on the temporary naming of the pneumonia as a new coronavirus infection, and the Chinese name for the coronavirus pneumonia was the “new coronavirus pneumonia” or “NCP” (3) when there was no official English name. On February 11, 2020, the novel coronavirus pneumonia was named “COVID-19” by WHO director-general Tan Taisai in Geneva, Switzerland, and the official English name became “COVID-19” (4, 5).

Based on the rapidly increasing number of confirmed and detected cases reported in Wuhan (6), COVID-19 is highly contagious, and it had posed a great threat to the health of the people of China and the world within a very short time (7, 8). The notification of the WHO on December 31, 2019, by the Chinese Health Authorities prompted health authorities in Hong Kong, Macau, and Taiwan to increase border surveillance, and this generated concern and fear that it could mark the emergence of a novel and serious threat to public health (9, 10). The virus was recognized by China and the WHO as a major public health event because of the uncertainty and complexity of its development (4), its ability to cause group behavior and the spread of public negative emotions, and its ability to have a serious impact on people’s mental health and affect their normal life, work routines, and social stability (11, 12). As a major catastrophic emergency, COVID-19 also had a broad and lasting influence, attracting the extensive attention of the media and being the subject of comprehensive media broadcasts as its influence has expanded further. Due to a variety of factors, such as environmental change (social development), humans are increasingly susceptible to both natural and technological disasters (13). In addition, with the rapid development of network communications, information cost is cheap and dissemination speed fast, and the masses were easily affected by the network of public opinion, which has led to deepening panic and uneasiness within this epidemic situation (14).

Previous studies have reported two special phenomena of regional perceived risk, namely, the typhoon effect and the ripple effect. The typhoon eye effect (15) indicates that the cognition of risk events at the epicenter is lower than the perceived risk at the surrounding areas, whereas the ripple effect (16, 17) indicates that the impact of risk events spreads out in a circle and gradually declines along with an increasing geographical distance. The psychological typhoon eye (PTE) effect focuses on the feelings and needs of people. After a disaster, those people living close to the center of the event or in high-risk areas are at risk of experiencing the worst consequences, hence triggering a “ripple effect” (18, 19). Zhang et al. (17) revealed an inverted U-shaped relationship between the distance of working adults from the pandemic epicenter and their burnout and found that

both typhoon and ripple effects may be observed in the same disaster event.

Maderthaner et al. (20) found that those residents living near nuclear reactors have a lower risk assessment of nuclear reactors than those living farther away. Melber et al. (21) also found that people living within the vicinity of nuclear facilities have a better evaluation of the safety of these facilities than the public. Lima (22) examined the distance between residents and waste incinerators in a 5-year longitudinal study and found that people who are living closer to incinerators have a higher risk perception and show less support for these structures compared with those living farther away. However, over time, these subjects developed a habitual response, that is, their risk perception was reduced.

Based on this phenomenon, Liang and Xue (23) introduced the concept of PTE, which posits that the psychological response of an individual located closer to the center of a disaster is calmer than that of an individual located farther away (24). For instance, the 2003 SARS outbreak in China triggered significant PTE effects where the risk awareness and psychological stress of people during the peak period were lower than those during the off-peak period (15). The same psychological effect was reported by Li et al. (25) after the 2008 Wenchuan earthquake. Meanwhile, Zheng et al. (26) proposed an “involvement” version of PTE and argued that the more they are involved in mining, the less villagers are concerned about pollution risks. Many scholars have also explored the causes of the PTE effect by using cognitive dissonance theory (27), simple exposure effect (21), and individual knowledge and experience theory (28).

Inspired by these theories, this study checks for any differences in the psychological and behavioral responses of people living across different regions during the early stage of the COVID-19 pandemic and determines whether a PTE effect has emerged during this period. This study defines the PTE effect as the spread of psychological and behavioral responses (15) and contends that the behavioral and psychological distress (29, 30) of people living in the worst-hit areas are less severe than those of people living outside these areas (i.e., those people living at the COVID-19 epicenter are the calmest). Given that the residents living outside the worst-hit areas show poorer cognition, emotions, and behaviors than those living at the epicenter, the impact of the COVID-19 pandemic has spread out and gradually increased along with geographical distance, thereby canceling out the ripple effect.

## METHODS

### Questionnaire Measurement Procedures

Following environmental psychology research (31) that examines the effects of the environment on individuals especially in the face of danger, this study investigates the PTE effect of the COVID-19 outbreak in Wuhan, Hubei, by using self-designed questionnaires. The pandemic has seriously affected the lives and mental health of people, thereby warranting an examination of their psychological stress and behaviors. We collected data on the risk cognition, stress response, behavioral response, and socio-demographic information [i.e., age, gender, marital status, education level, and physical conditions (i.e., COVID-19

infection)] of individuals living in three areas, namely, Wuhan, the cities around Wuhan in Hubei Province, and the cities outside Hubei, that have been affected by COVID-19 to different degrees. The questionnaire employed three subscales. First, the risk cognitive subscale (RCS) asked the questions “Do you think the NCP is serious now?,” “Do you think that you are in danger in the face of the pandemic?,” “What are your chances of catching the NCP?,” and “Do you think that the NCP can be cured?” The respondents can respond positively or negatively. Second, the stress response subscale (SRS) asked the questions “Have you been afraid of the pandemic for no reason?,” “Do you feel more nervous than usual?,” “Do you feel depressed?,” “Are you under great pressure?,” “Are you losing weight?,” and “Are you becoming sensitive and suspicious?” The respondents can answer in a variety of ways, including calm, tension, anger, fear, bored, worry, and happy, among others. Third, the behavioral response subscale (BRS) asked the questions “Do you pay attention to authoritative information?,” “Do you focus on information related to the pandemic?,” “Are you eager to investigate?,” “Do you talk to strangers?,” and “Do you look for information related to self-adjustment?” (32).

Each question was rated on a 4- or 5-point scale, with 1 denoting “least severe or not consistent” and 4 or 5 denoting “most severe or very consistent.” The scores received by each item were then averaged. For example, the item related to the severity of the epidemic in Wuhan can receive a compound score of 4.33 (32).

Sampling was conducted in three areas between January 29–31, 2020, when the epidemic had been spreading for 1 month. This period fell during the second week after the regional governments adopted policies closing cities on January 23, 2020 (33); people were seriously threatened by the epidemic, and their lives and mental health are severely affected. The questionnaire was compiled through the Questionnaire Star platform (Wenjuanxing, <http://www.wjx.cn>), and the distribution and completion of the questionnaire were accomplished using WeChat, QQ, and Sina microblog.

A total of 2,046 residents from the three selected areas completed the questionnaire on 29 January, and exploratory factor analysis (EFA) and principal component analysis (PCA) were conducted to explore the factorial structure of the three subscales. Meanwhile, 2012 residents completed the questionnaire on January 30, and confirmatory factor analysis (CFA) was conducted to explore the structural validity of the subscales.

### PCA of the Risk Cognitive Subscale (RCS)

The KMO test and Bartlett’s test of sphericity (Kaiser–Meyer–Olkin measure of sampling adequacy = 0.62, chi-square = 815.17,  $df = 15$ ,  $p < 0.001$ ) indicated that the correlation matrices on which the PCA was based were suitable for analysis. An examination of the scree plot indicated that the extracted components could be restricted to two, suggesting a two-factor model with 6-item: cognition of danger and cognition of protection consciousness. Exploratory factor analysis showed that the eigenvalues were greater than one (altogether explaining 49.51% of the variance), and the factor loadings ranged from 0.52

**TABLE 1** | Items loadings, eigenvalues and variance of the RCS with PCA.

Factor	Item	Number	Loading	Eigenvalue	% of variance
Recognition of danger	The severity of the epidemic	R1	0.62	1.74	25.25
	Necessary isolation of villages	F2	0.64		
Cognition of protection consciousness	Own risk	R2	0.6	1.23	24.26
	Probability of catching the NCP	R3	0.52		
	Protective measures’ identification	F1	0.69		
	NCP can be cured	R4	0.72		

to 0.72, suggesting that the risk cognitive subscale’s structural validity was acceptable (see **Table 1**).

### PCA of the Stress Response Subscale (SRS)

The KMO test and Bartlett’s test of sphericity (Kaiser–Meyer–Olkin measure of sampling adequacy = 0.92, chi-square = 10,587.91,  $df = 55$ ,  $p < 0.001$ ) indicated that the correlation matrices on which the PCA was based were suitable for analysis. An examination of the scree plot indicated that the extracted components could be restricted to two, suggesting a two-factor model with 11 items: emotional responses and somatic reactions. Exploratory factor analysis showed eigenvalues greater than one (explaining a total of 58.27% of the variance) and factor loadings ranging from 0.50 to 0.83, suggesting that the structural validity of the SRS was acceptable (see **Table 2**).

### PCA of the Behavioral Response Subscale (BRS)

The KMO test and Bartlett’s test of sphericity (Kaiser–Meyer–Olkin measure of sampling adequacy = 0.84, chi-square = 4,604.52,  $df = 28$ ,  $p < 0.001$ ) indicated that the correlation matrices on which the PCA was based were suitable for analysis. An examination of the scree plot indicated that the extracted components could be restricted to two, suggesting a two-factor model with eight items: attention to information and behavioral reactions. Exploratory factor analysis showed eigenvalues greater than one (altogether explaining 57.22% of the variance) and factor loadings ranging from 0.56 to 0.84, suggesting that the structural validity of the BRS was acceptable (see **Table 3**).

To further verify the consistency between the model and the real situation, we conducted a confirmatory factor analysis on the data obtained from the formal questionnaire. The fit indexes of the 3-subscale model of 25 items (see **Tables 1–3**) were not ideal. After deleting the items with low correlations with this factor in the RCS, SRS, and BRS, it can be seen from **Table 4** that the fit indexes of the 3-subscale model with 18 items (**Figure 1**) were higher than those of the 3-subscale model with 25 items and



**TABLE 2** | Items loadings, eigenvalues and variance of the SRS with PCA.

Factor	Item	Number	Loading	Eigenvalue	% of variance
Emotional responses	More nervous and anxious	Q1	0.73	5.26	35.33
	Afraid for no reason	Q2	0.74		
	Easily upset or frightened	Q3	0.82		
	Feel depressed	Q4	0.77		
	Unable to calm down	Q5	0.83		
Somatic reactions	Losing weight	T1	0.50	1.15	22.94
	Feel tired for no reason	T2	0.62		
	Affecting normal work and rest	Y4	0.74		
	Under great pressure	L1	0.74		
	Getting angry or grumpy	Y1	0.68		
	Becoming sensitive and suspicious	L5	0.67		

**TABLE 3** | Items loadings, eigenvalues and variance of the BRS with PCA.

Factor	Item	Number	Loading	Eigenvalue	% of variance
Attention to information	Attention to authoritative information	G1	0.78	1.25	16.01
	Information of self-adjustment	L4	0.78		
Behavioral reactions	Think all have novel coronavirus	R5	0.84	3.33	41.21
	Washing or cleaning hands	X3	0.77		
	Eager to have an investigation	Y5	0.71		
	Initiative to avoid strangers	J4	0.81		
	Focusing on the epidemic information	X1	0.70		
	Dare not talk to strangers	J3	0.56		

conform to the theoretical concept of this study. The fit indexes of the two models are shown in **Table 4**.

Briefly, the questionnaire was divided into three subscales: the risk cognition subscale (RCS), the stress response subscale (SRS), and the behavioral response subscale (BRS). Each subscale had two factors representing different psychological and behavioral states. The RCS consisted of five items, the SRS consisted of seven

**TABLE 4** | Evaluation of questionnaire models.

Index	CMIN/df	RESEA	NFI	IFI	CFI	GFI
3-sub-scale model of 24 items	20.92	0.10	0.70	0.72	0.71	0.85
3-sub-scale model of 18 items	25.67	0.11	0.73	0.74	0.74	0.89

items, and the BRS consisted of six items. The structure of the RCS, SRS, and BRS are shown below (**Table 5**).

## Formal Investigations

### Participants

A revised 18-item questionnaire (**Table 5**) was closed on January 30–31 by 4,076 residents after the exploratory factor analysis. Participants included 1,363 (33.44%) residents of Wuhan, 1,320 (32.38%) residents of cities around Wuhan in Hubei province, and 1,393 (34.18%) residents of cities outside Hubei province. There were 1,929 males and 2,147 females with an average age of  $20.17 \pm 2.88$  years; this was a representative group, generalized due to the homogeneity of the group, and young people were recruited via social media. All respondents had not been infected with the COVID-19 and voluntarily participated in the survey (**Table 6**).

The variables were generally distributed, and the multiple testing was controlled.

### Statistical Analyses

The statistical analyses were performed using SPSS 20.0 for Windows (SPSS Inc., Chicago, Illinois). The statistical methods and data analysis results were described in detail as follows.

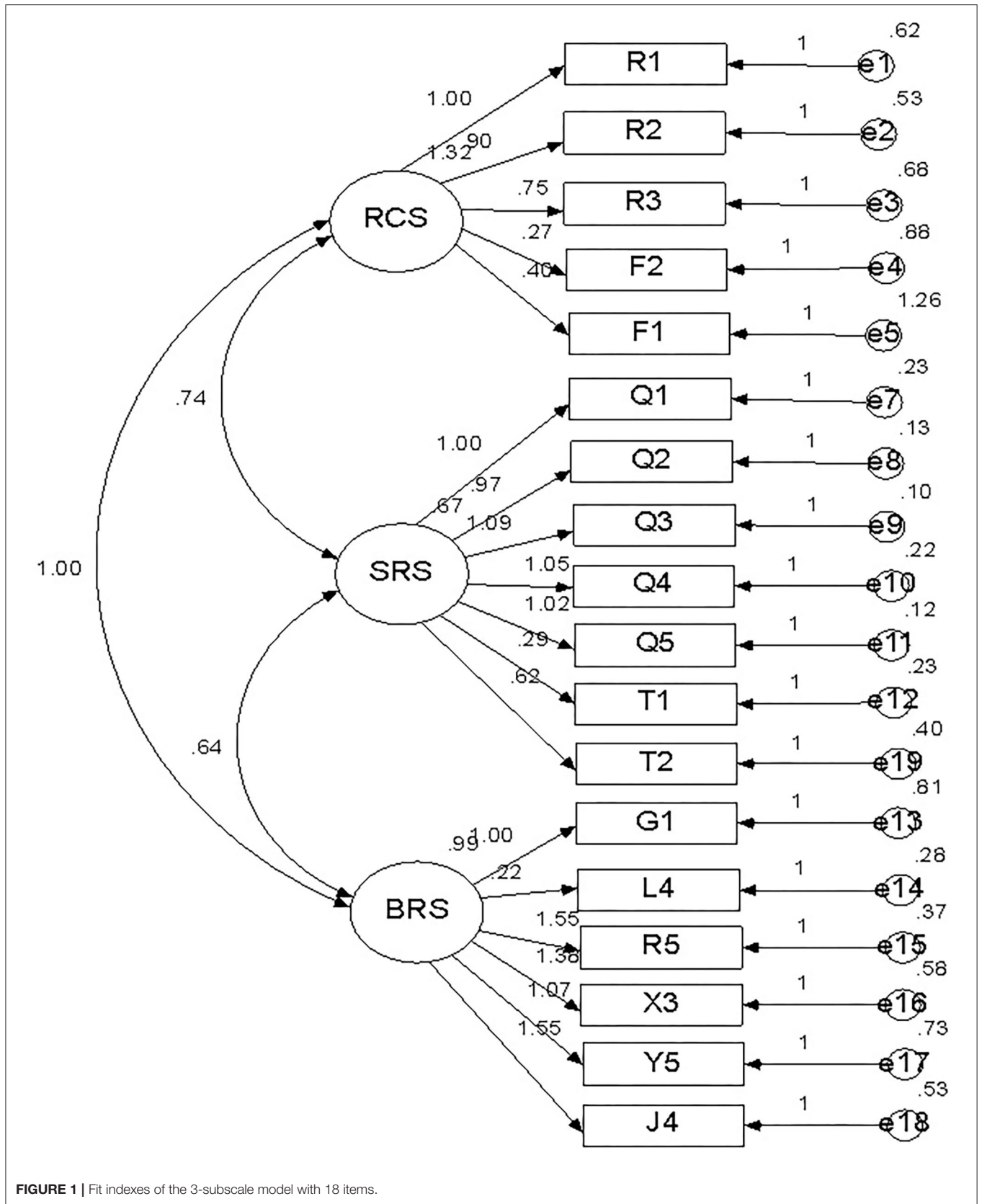
We conducted the ANOVA for the items in the three subscales for the three regions and the LSD for the multiple comparisons. The results of the ANOVA and LSD showed that there were statistically significant differences among the three groups with respect to their RCS, SRS, and BRS scores, and there were some commonalities among some items with regard to the three subscales (see **Figures 2–4**).

## RESULTS

### Differences in Risk Cognition Among the Residents of the Three Areas

#### Cognition of Danger

The ANOVA and LSD showed that there were no significant differences in cognition of the epidemic severity [ $F_{(2, 4,073)} = 0.083, P = 0.921$ ] among the residents of the three areas. Most of the participants agreed that the epidemic was very serious. However, there was a major difference in terms of the necessary isolation of villages [ $F_{(2, 4,073)} = 10.498, P < 0.001$ ] among the residents of the three areas. Residents of cities around Wuhan in Hubei province were the most supportive of social isolation, they had the greatest fear of the virus spreading, and they supported combating the virus through isolation. Conversely, the residents of Wuhan city were the least supportive.



**TABLE 5 |** The structure of the RCS, SRS, and BRS.

Factor	Recognition of danger	Cognition of protection consciousness
RCS	The severity of the epidemic Necessary isolation of villages	Protective measures' identification Own risk Probability of catching the NCP
Factor	Emotional responses	Somatic reactions
SRS	More nervous and anxious Afraid for no reason Easily upset or frightened Feel depressed Unable to calm down	Losing weight Feel tired for no reason
Factor	Attention to information	Behavioral responses
BRS	Attention to authoritative information Information of self-adjustment	Think all have novel coronavirus Washing or cleaning hands Eager to have an investigation Initiative to avoid strangers

**TABLE 6 |** Description of samples in three areas.

Areas	N	Gender (M/F)	Mean age (SD)
Wuhan City	1,363/1,363	600/763	19.85 (2.80)
Cities around Wuhan in Hubei province	1,320/1,320	630/690	19.52 (1.74)
Cities outside Hubei province	1,393/1,393	699/694	21.11 (3.50)

**Cognition of Protection Consciousness**

The ANOVA and LSD showed that there were significant differences in people's own risk cognition [ $F_{(2,4,073)} = 6.625, P = 0.001$ ], the probability of catching the NCP [ $F_{(2, 4,073)} = 15.865, P < 0.001$ ], and protective measures' cognition [ $F_{(2, 4,073)} = 18.073, P < 0.001$ ] among the residents of the three areas. Residents of cities outside Hubei province thought they were in the greatest danger, but the residents of Wuhan city and of the cities around Wuhan in Hubei province felt less danger. In addition, residents of cities outside Hubei province thought they were the most likely to be infected, but the residents of cities around Wuhan in Hubei province felt that they were less likely to become infected, and the residents of Wuhan city thought they were the least likely to become infected. Compared to the residents of Wuhan city, the residents of cities around Wuhan in Hubei province and outside Hubei province had the greatest belief in the effectiveness of wearing masks, washing hands and disinfecting, and they were more confident that they could prevent infection in this way. Participants from Wuhan city were the least cautious or most skeptical regarding virus protection measures. The statistical analysis results are shown in **Figure 2** below.

**Stress Response Differences Among Residents of the Three Areas Emotional Responses**

The ANOVA and LSD shown there are the significant differences in the emotional responses among the residents of the three areas, including being more nervous and anxious [ $F_{(2, 4,073)} = 8.985, P < 0.001$ ] afraid for no reason [ $F_{(2, 4,073)} = 12.273, P < 0.001$ ], easily upset or frightened [ $F_{(2, 4,073)} = 9.931, P < 0.001$ ], depressed [ $F_{(2, 4,073)} = 5.541, P = 0.004$ ], and unable to calm down [ $F_{(2, 4,073)} = 7.335, P = 0.001$ ]. Residents of cities outside Hubei province were the most nervous and anxious, the most afraid for no reason, the most easily upset or frightened, the most depressed, and the most unable to calm down, while the residents of Wuhan city and cities around Wuhan in Hubei province reported these negative feelings less frequently. The residents of Wuhan city were the least afraid for no reason, and the residents of cities around Wuhan in Hubei province were the least nervous and anxious, least upset or frightened, least depressed, and least unable to calm down.

**Somatic Reactions**

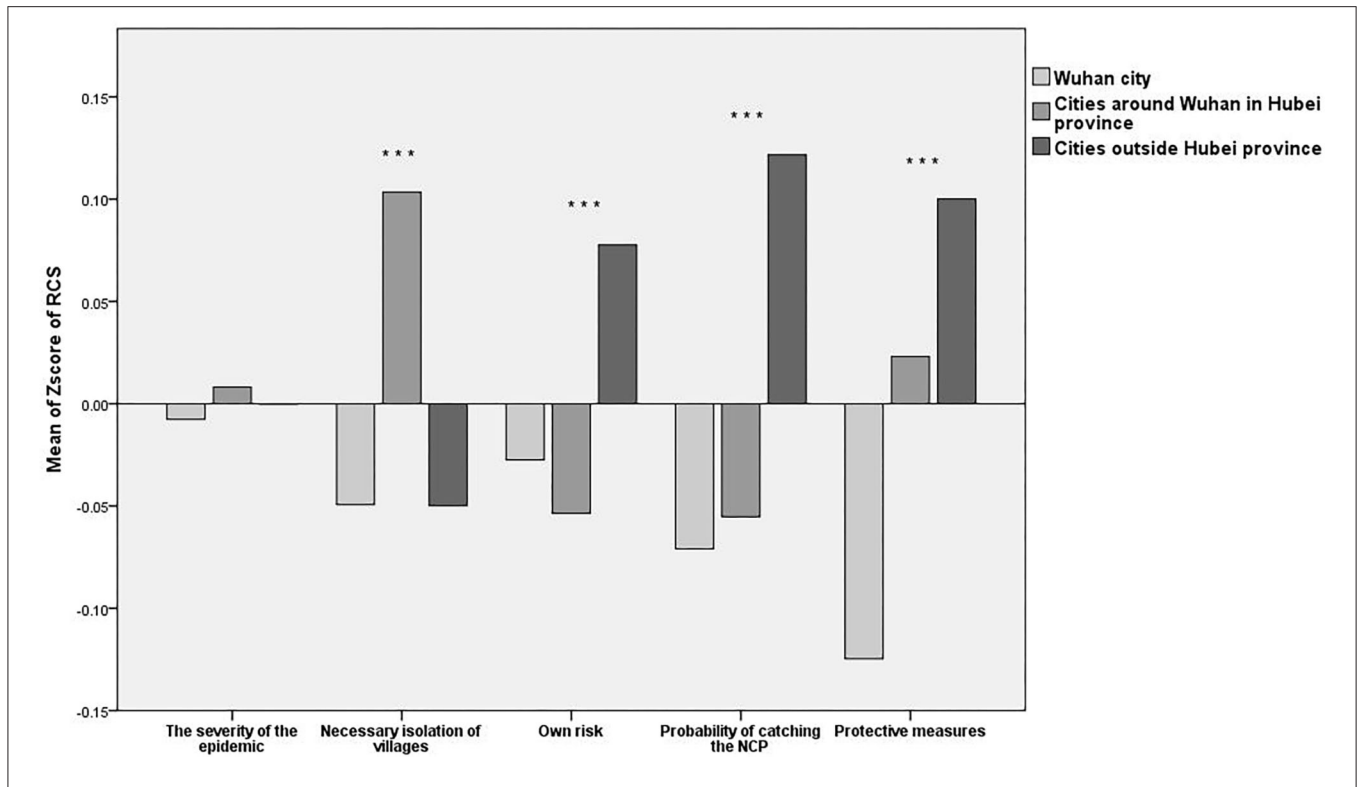
The ANOVA and LSD showed that there was no significant difference in losing weight [ $F_{(2, 4,073)} = 2.58, P = 0.076$ ] among the residents of the three areas. Most participants did not significantly lose weight as a result of the epidemic. However, there was a significant difference in the participants' moods and whether they felt tired for no reason [ $F_{(2, 4,073)} = 3.077, P = 0.046$ ]. The residents of cities outside Hubei province were the most prone to feel tired for no reason. The residents of Wuhan city and of cities around Wuhan in Hubei province felt comfortable, and the residents of cities around Wuhan in Hubei province were the most comfortable. The statistical analysis results are shown in **Figure 3** below.

**Behavioral Response Differences Among the Residents of the Three Areas Attention to Information**

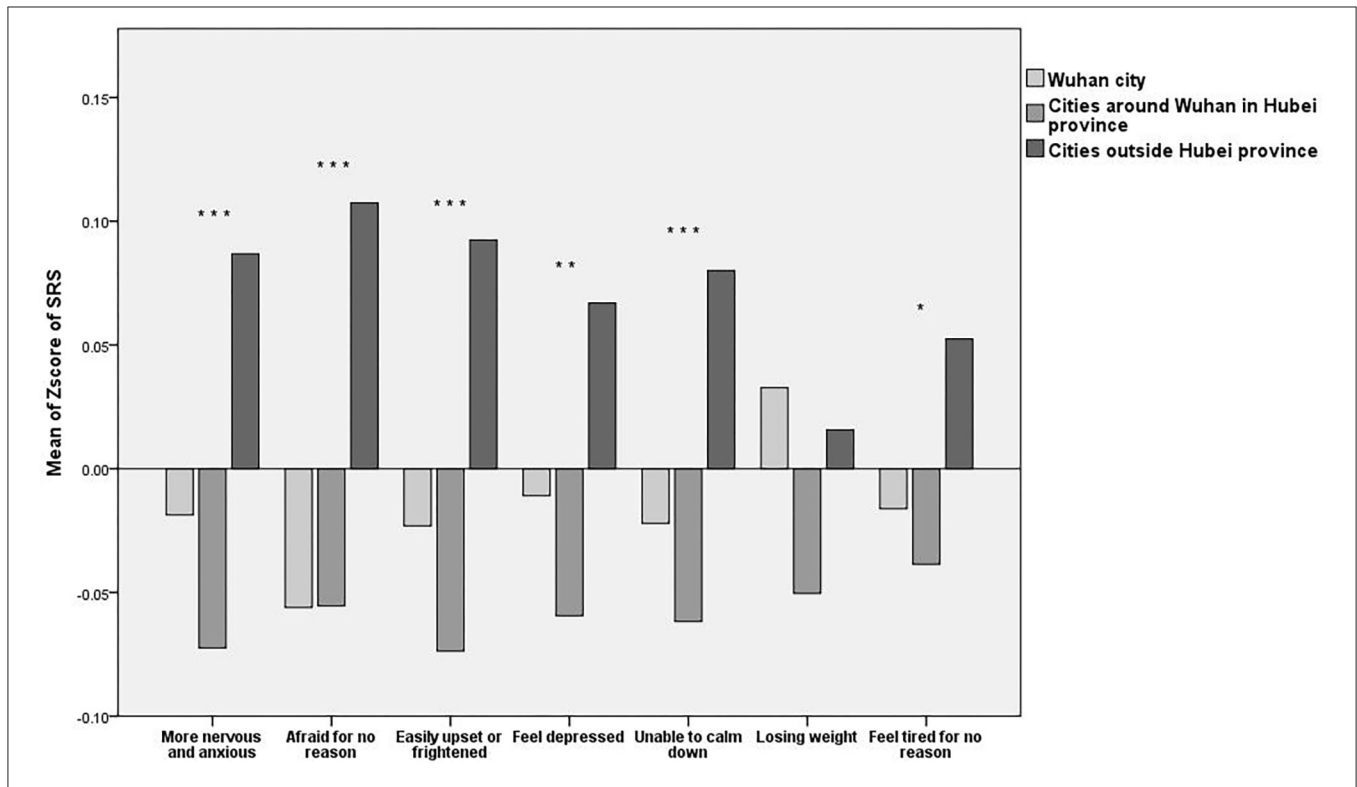
The ANOVA and LSD showed that there were significant differences in terms of the participants' attention to authorities [ $F_{(2, 4,073)} = 16.076, P < 0.001$ ] and whether they looked for information resources for self-adjustment [ $F_{(2, 4,073)} = 6.005, P = 0.002$ ]. The residents of cities outside Hubei province paid attention to authoritative information, but the residents of Wuhan city and of cities around Wuhan in Hubei province were less concerned. The residents of cities outside Hubei province more frequently searched for psychological adjustment information, while the residents of Wuhan city and the residents of cities around Wuhan in Hubei province needed less psychological adjustment.

**Behavioral Responses**

The ANOVA and LSD showed that there were no significant differences among the residents of the three areas in terms of thinking (making some judgments) that all strangers have the novel coronavirus [ $F_{(2, 4,073)} = 0.118, P = 0.897$ ], frequently washing or cleaning hands [ $F_{(2, 4,073)} = 2.186, P = 0.112$ ], and taking the initiative to avoid strangers [ $F_{(2, 4,073)} = 2.753,$

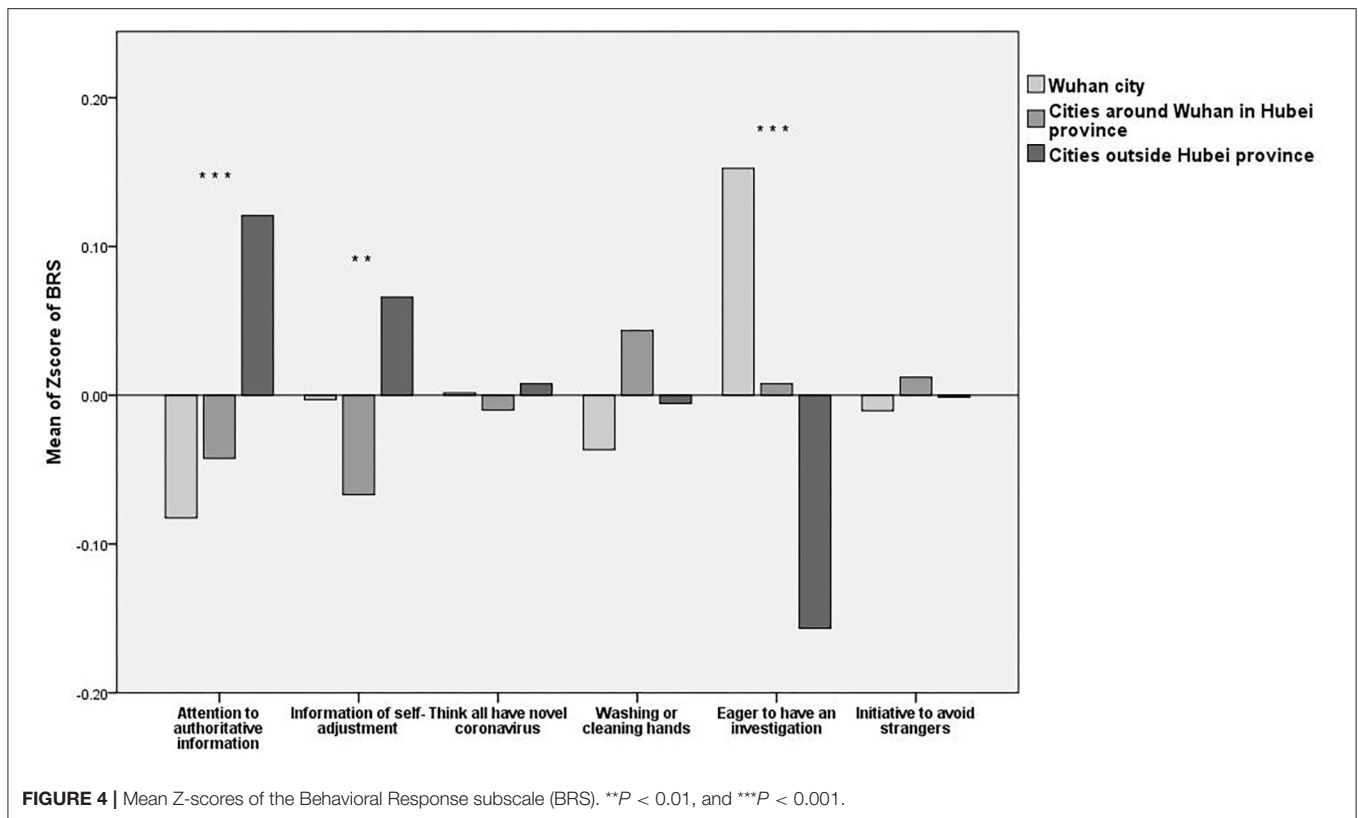


**FIGURE 2** | Mean Z-scores of the Risk Cognitive subscale (RCS). \*\*\* $P < 0.001$ .



**FIGURE 3** | Mean Z-scores of the Stress Response subscale (SRS). \* $P < 0.05$ , \*\* $P < 0.01$ , and \*\*\* $P < 0.001$ .





$P = 0.064$ ]. Most participants thought that strangers were carrying the virus, agreed that washing or cleaning hands could prevent the virus and practiced hand washing frequently, and took the initiative to avoid strangers. The data also showed that there was a significant difference in wanting to have a physical investigation [ $F_{(2, 4,073)} = 33.537, P < 0.001$ ] among residents of the three areas. The residents of Wuhan city were the most doubtful about their health and more eager to have a general investigation. The residents of cities around Wuhan in Hubei province were less eager to have a general investigation, and the residents of cities outside Hubei province were the most eager. The statistical analysis results are shown in **Figure 4** below.

## DISCUSSION

The survey data show proof of a PTE effect at the initial stages of the COVID-19 outbreak (17, 34), but no ripple effect was observed. Specifically, the respondents showed PTE effects in their cognition and emotions (the degree of their cognitive and emotional responses increased along with geographical distance) but did not show PTE effects in their behaviors.

### Psychological Typhoon Eye Effect of Cognition

As the number of confirmed cases and deaths from the epidemic continued to rise daily, most residents truly felt the threat from

the virus, and participants in Wuhan, cities around Wuhan in Hubei province, and cities outside Hubei province generally believed that the NCP was horrible (18). In addition, participants from the three regions exhibited some significant differences in other aspects of their cognition of the epidemic, especially in places that differed from the usual perception, clearly showing psychological typhoon eye effects. For instance, residents of cities outside Hubei province thought they were most at risk of contracting COVID-19, and residents of Wuhan city and cities around Wuhan in Hubei province perceive lower risk of contracting COVID-19. Residents of Wuhan city perceived the least danger of the virus spreading and expressed the least support for isolating villages. Residents of Wuhan had the least cognition of protection consciousness and the lowest proportion of participants who scored highly (wearing masks, washing their hands frequently, and disinfecting regularly). Although Wuhan was the worst-hit area, with the highest number of people infected and the highest speed of transmission, among the study participants, the Wuhan residents had the lowest perception of whether they could be infected with the virus.

### Psychological Typhoon Eye Effect of Emotions

The psychological typhoon eye effect was the most obvious in the emotions of residents during the epidemic period, and this was reflected in multifarious negative emotions such as anxious thought, fearful thought, and depressed mood. Participants who

were farther from the center of the epidemic had a higher intensity of negative emotions than those who were closer to the center. The proportion of residents in cities outside Hubei province who responded positively to the item “it was easier to be nervous thought and anxious thought than usual” was higher than the proportion of residents of the other two regions who responded the same way. Compared to residents of the other regions, Wuhan residents showed the most stable state of mind; they had the lowest proportion of unprovoked fear. Residents outside Hubei province were the most likely to feel depressed, uneasy, and restless, and the Wuhan participants were the least likely. The residents who were closer to the center of the epidemic had more positive emotions and were more relaxed than the residents of the other two regions.

## Psychological Typhoon Eye Effect of Behaviors

During the transmission of COVID-19, residents were able to consciously take protective measures, such as washing their hands frequently and wearing masks. Regarding behavioral responses, participants were able to diversify their web-based messaging platforms to maximize the breadth and depth of their knowledge about COVID-19. Meanwhile, significant psychological typhoon eye effects were not found in the behavioral responses of residents. Residents outside Wuhan city paid more attention to the epidemic and authoritative information that was released. In addition, compared with the other two regions, residents from outside Hubei province had the highest average score for active self-adjustment; residents outside Hubei province were more inclined to look for information resources to deal with their negative emotions and more actively relieve stress.

The residents across the three areas show consistent behavioral responses to the pandemic, and these responses may have been more stable than their emotions and cognition. Therefore, a sustainable healthcare service for guiding cognition and emotions is urgently needed during the COVID-19 outbreak, and different measures should be adopted across various areas.

## Limitations

This study had several limitations (32). First, the questionnaire was a self-report questionnaire in the context of China’s culture, and the psychological symptoms and assessments were not confirmed via clinical evaluations. Second, the residents were just the young group (people) recruited in social media. Third, the study design was cross-sectional, which fails to provide valid information about the previous mental health of the subjects.

## CLINICAL IMPLICATIONS

The World Health Organization declared the COVID-19 outbreak a pandemic (35), and many countries have introduced social distancing measures (with some cities even closing themselves to public) to curb the transmission of the virus. These measures, which have ranged from mandatory quarantine to voluntary self-isolation, have socially isolated many people, thereby placing their mental and emotional health at risk (36).

Based on our findings related to the PTE effect of the pandemic, mental health intervention measures for residents residing in different areas or countries should be an important part of national disaster programs. Governments, media platforms, mental health services, and social support groups can also help alleviate negative cognition and emotions.

## Mental Health Intervention Measures for Residents of the Worst-Hit Areas

### Strengthening Emotional Guidance

The survey found that compared to residents of the two other regions, residents of Wuhan were more noncommittal about negative states, paid less attention to authoritative and positive events, and appeared to be in a more careless state. This might be related to long-term exposure to a dangerous environment, resulting in taking a dim view. Thus, we should quickly inform those near the center of the epidemic about the seriousness of epidemic prevention and control, strengthen their awareness of the crisis, and place the whole city on alert. In addition, more influential news media, especially the WeChat official account that most people paid attention to, should provide some credible scientific resources about how to correctly understand and view self-emotion and how to effectively adjust negative emotions.

### Strengthening Education About Protection Consciousness

The survey found that residents of Wuhan had insufficient awareness of virus protection and paid less attention to official information than residents of the other two areas. Therefore, relevant media needs to pay close attention to the situations of residents; do a good job as disseminators of the official “virus protection guide,” popular science, and protection knowledge; improve residents’ protection consciousness; enhance risk assessment and prevention awareness; urge residents to objectively and carefully understand the characteristics and dynamics of the epidemic situation; pay attention to the sources of infection risk; prevent residents from being inattentive and blindly optimistic; and encourage residents to develop good health habits.

### Strengthening Training on Effective Responses

The study found that compared to residents of the two other regions, people in Wuhan were less concerned about authoritative information, were more eager to thoroughly check their physical condition, and were less likely to adopt appropriate channels for psychological adjustment to reduce their stress. Obviously, these actions are not conducive to maintaining psychological balance in the face of an epidemic, and they tend to aggravate people’s negative emotions. Different behavioral responses to stressful events can also affect individuals’ psychological responses and stress states, especially in the subconscious context. Therefore, we should guide people near the center of the epidemic to acknowledge their objective environments, internal emotions and stress responses and adopt appropriate, reasonable, and effective response behaviors to attempt to solve problems. Furthermore, the government should establish psychological support institutions and strengthen

publicity and training to enhance the awareness and behavior of Wuhan citizens seeking psychological assistance.

### **Mental Health Intervention Measures for Residents Outside the Worst-Hit Areas Eliminating Unprovoked Fear and Building a Sense of Security**

The survey found that residents outside Wuhan were more worried, more uncertain about the risk, more afraid of being infected, and less confident than residents of the other two regions. We need to pay attention to this category of residents and provide emotional counseling (37, 38), reducing tension and improving logical thinking to help them to vent their tension and fear. Relevant information release platforms should guide them to examine whether their access to information is reliable to examine whether the source of their own insecurity and threats is true and to improve their information literacy and reasonable questioning ability to correctly assess the accuracy of information. For areas outside the center of the epidemic, it is suggested that the government should increase information transparency, provide timely disclosure of the latest status of the epidemic, offer timely refutation of rumors, and use simple and easy to inform people about the current status and how to address it.

#### **Timely “Disconnection” From Negative Information**

The survey found that compared to residents of the other two regions, residents outside Wuhan tended to pay more attention to information from the Internet, and their emotions were more easily affected. Many residents suffered from receiving negative and upsetting information and fell into a vicious cycle of “hypochondriac concerns - physical discomfort - anxiety aggravation”; the symptom characteristics were examined by consideration of an anxious mood, depressed mood, anxiety sensitivity (39). Although information is useful, people should not be too eager to read it, as this can make it difficult to eliminate negative emotions, and residents such as these will be more prone to worry, fear, and other negative emotions. Currently, what is needed is timely “separation” that can allow these individuals to decrease the amount of attention they give to the epidemic situation. The correct reporting principle was neither complete epidemic information nor no epidemic information, which could make residents work and rest regularly.

#### **Accurate Cognition of Stress and Acceptance of Self-Response**

During an epidemic situation, everyone experiences different degrees of psychological distress, and we should therefore provide early warnings in a timely way so that residents are ready to accept negative emotions and psychological problems. The relevant departments should work to calm and help residents during the epidemic so that they do not experience as much doubt and worry. The relevant departments should also guide residents to try to accept some negative emotions and their own reactions so that they are aware of psychological changes and can

become more accepting of the objective existence of a negative psychological state during the epidemic. This will allow residents to look at and recognize themselves to then solve problems and face psychological crises more rationally.

### **CONCLUSION**

The current research indicated that COVID-19 had affected the mental health and daily lives of the residents of three areas. Residents who were closer to the center of the epidemic were more relaxed, less anxious or panicked, paid less attention to authoritative and psychological adjustment information, sensed less danger, and experienced fewer emotional reactions in the earlier phase of COVID-19 than residents who were farther away. More attention should thus be paid to this group.

### **DATA AVAILABILITY STATEMENT**

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

### **ETHICS STATEMENT**

The study was designed in accordance with the tenets of the Declaration of Helsinki. Approval from the ethical authority of School of Educational Science, Huazhong University of Science and Technology was granted. Confidentiality and the statement confirming informed consent was managed by placing anonymous coding of one self-report questionnaires.

### **AUTHOR CONTRIBUTIONS**

YZ, GW, SX, FH, YB, ML, NL, and XC: conceived and designed the questionnaire. GL and JZ: recruitment and payment of participants. GW, YZ, and QX: analyzed the data. GW, SX, GL, and XC: wrote and revised the paper. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Epidemic Rumination and Resilience on College Students' Depressive Symptoms During the COVID-19 Pandemic: The Mediating Role of Fatigue

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The restriction of numerous sectors of society and the uncertainty surrounding the development of the COVID-19 pandemic have resulted in adverse psychological states to college students isolated at home. In this study, we explored the mediating role of fatigue in the effects of epidemic rumination and resilience on depressive symptoms as well as how epidemic rumination and resilience may interact with one another. A large sample of Chinese college students ( $N = 1,293$ ) completed measures on epidemic rumination, resilience, fatigue, and depressive symptoms. Results indicated depressive symptomology was positively predicted by epidemic rumination while negatively predicted by resilience. In both cases, fatigue partially mediated these effects and positively predicted depressive symptoms. Unexpectedly, epidemic rumination and resilience interacted in a manner where the effect of rumination on fatigue became stronger as resiliency increased. Theoretical and practical implications are provided to further interpret the results.

**Keywords:** COVID-19, epidemic rumination, depression, fatigue, resilience

## INTRODUCTION

The heavy losses to the lives and property of people around the world from the global outbreak and spread of COVID-19 has induced severe psychological trauma to those affected. China was one of the earliest countries to be affected by COVID-19 and likewise one of the first to implement widescale measures to curb viral spread. In an effort to limit the spread among youth on college campuses, the Ministry of Education in China extended Winter recess and postponed the start of Spring semester. For Chinese college students, prolonged time at home with limited ability to go outside meant doing one's part to stop the spread of COVID-19. However, this came at the cost of abating their participation in normative social activities, such as meeting friends or participating in extracurricular activities. Such public health measures have led to a downstream torrent of negative mental health outcomes. Indeed, several studies have found that COVID-19 related stressors accrued a myriad of negative effects on mental health, such as inducing symptoms of both anxiety and depression [e.g., (1–3)].

Although few in number, these early studies have troubling implications for the general public knowing that depression has been linked to high rates of morbidity, recurrence, disability, and suicide (4), and has since become one of the major factors endangering human health (5). While

some evidence suggests that the physiological damage caused by depression may be short-lived, the psychological effects may be long-term (5). As is the case with many large-scale disasters, the negative mental effects COVID-19 induced on its general populace is rudimentary. Despite this, little attention has been given to the mental health status of younger individuals within the COVID-19 body of research (6). Because college students are often at the developmental stage in which they transition from adolescence to adulthood, this population may be particularly at risk. As the world continues its fight against the pandemic, it remains highly imperative to probe the antecedents of the onset of depressive symptoms amongst college students to design effective social interventions (7–9). Contributing to this significant gap in literature, we explored how resiliency and COVID-19 specific rumination may, respectively, mitigate and exacerbate fatigue, which in turn, increases the severity of depressive symptoms. Further, we examined whether resiliency and rumination interacted in a manner such that resiliency buffered the effect of rumination on fatigue.

## Epidemic Rumination and Depression

One's susceptibility to depression is partly contingent upon individual factors that can play a promotive role in the occurrence and development of the mental illness (10). Specifically, ruminative response style is argued to be a key risk factor for depression (11). Rumination is characterized by persistent and passive cognitive deliberation of negative stressors and events, ultimately aggravating preexisting depressive symptoms (12, 13) and crippling one's abilities for positive problem-solving (14–16). Those who exhibit greater rumination have been documented to experience more intense negative emotions (4, 17–19) and sense of hopelessness (20). Accordingly, rumination is largely in part considered a maladaptive response to stressors, given its large consumption of cognitive resources.

As rumination hinders adaptive problem-solving (21) and induces greater hopelessness (20), individuals may further lose the motivation to tackle the source of the issue, resulting in prolonged depressive symptoms (22). Early evidence of the role of rumination on stress consequences amid the COVID-19 pandemic has generally supported prior findings [e.g., (3, 23)]. However, these studies have measured general ruminative tendencies within the individual. Because it may be possible that individuals that otherwise do not engage in rumination during normative times developed ruminative tendencies specific to only COVID-19, we contend that a more target-specific approach may be necessary to better capture the cognitive responses to the novel virus. Following the definition of general rumination (24), we define *epidemic rumination* as ruminative tendencies specifically pertaining to the events surrounding COVID-19. Given evidence of the link between rumination and depression (15, 25), individuals with high levels of epidemic rumination may exhibit greater depressive symptomology (4, 17–19).

## Resilience and Depression

While epidemic rumination is a risk factor for depression, there are also those who show resiliency to life stressors. Resiliency refers to one's ability to actively adapt and cope with the impact of stress or trauma (26), showing adversity in the face of setbacks

(27, 28) and generally adept at maintaining or promoting positive mental health outcomes (29). Accordingly, those with greater resiliency generally tend to exhibit lower levels of depression (30–32). In the midst of the COVID-19 pandemic, a slew of recent studies has shown that resilient healthcare professionals experienced lower anxiety, posttraumatic stress, and depression (33, 34). Among the general populace, similar patterns emerged (30, 32, 35, 36). In other words, those who were able to adaptively cope with COVID-19 related stressors were better equipped to attenuate the onset of emotional distress consequences (37, 38). Thus, individuals able to remain steadfast and optimistic in spite of the current turbulent state of the world may be less likely to suffer from depressive symptoms.

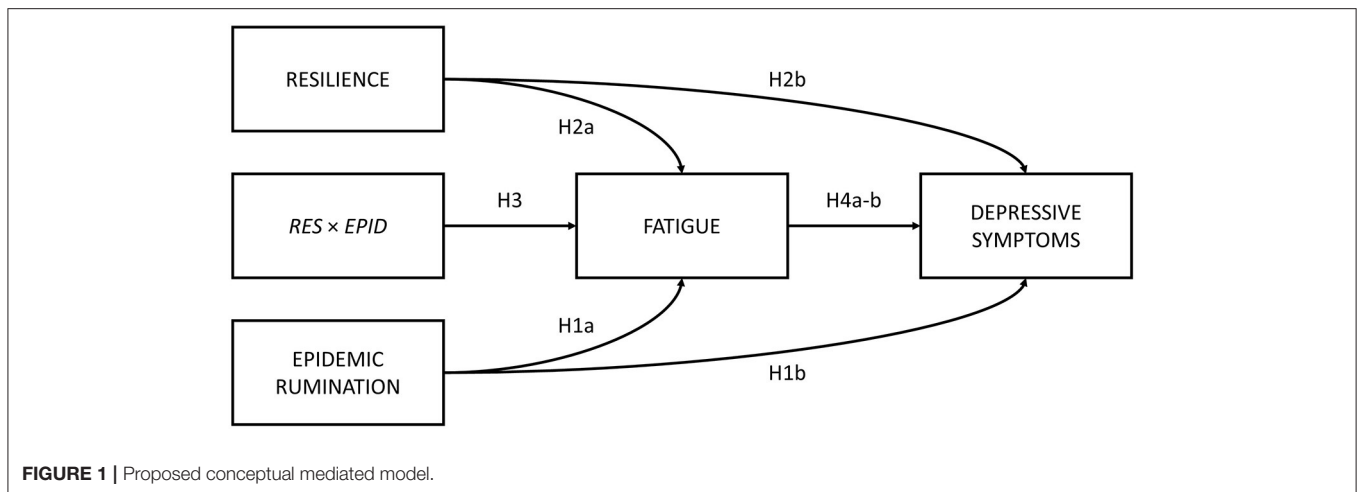
## The Mediating Role of Fatigue

With the prolonged nature and intensity of COVID-19, however, many individuals will naturally experience some form of fatigue, whether that be physical or psychological (39). This may be particularly the case for college students who are often not adept at handling sudden and large life stressors (40, 41), putting them at greater risk for developing depressive symptoms. As fatigue is a common byproduct of depleted psychological resources, risk factors [e.g., rumination; (42, 43)] and protective factors [e.g., resiliency; (44)] for said resources may, respectively, exacerbate and mitigate the onset of physical and psychological fatigue among individuals. Specifically, Luceño-Moreno et al. (34) found a strong negative relation between resilience and experience of emotional exhaustion among those impacted by COVID-19. In this regard, resilience may serve to not only directly reduce the experience of fatigue, but also serve to buffer the negative consequences of observed risk factors (e.g., epidemic rumination) (26, 45) through cognitive reappraisal (46). This may be especially critical given the rudimentary nature of fatigue in its risk to the negative consequences of life stressors (47), such as depression (48–50).

## The Present Study

The present study sought to first examine the roles of epidemic rumination and resilience on depressive symptoms. Secondly, the current study examined the mediating role of fatigue in the aforementioned relations. Lastly, we examined whether epidemic rumination and resilience interacted with one another in their effect on fatigue. We proposed a conceptual model (**Figure 1**) and the following hypotheses:

- Hypothesis 1.** Epidemic rumination is positively related to (a) fatigue and (b) depressive symptoms.
- Hypothesis 2.** Resilience is negatively related to (a) fatigue and (b) depressive symptoms.
- Hypothesis 3.** Epidemic rumination and resilience significantly interact such that resilience buffers the effects of rumination on fatigue.
- Hypothesis 4.** Fatigue is positively related to (a) depressive symptoms and mediates the effect of (b) epidemic rumination and (c) resilience on depressive symptoms.



## METHODS

### Participants

A large sample of 1,293 college students in China ( $M_{age} = 20.79$ ,  $SD_{age} = 1.67$ , 52% Female) were recruited for this study. A total of 464 (35.90%) participants were first years, 271 (21.00%) were second years, 310 (24.00%) were third years, and 248 (19.20%) were fourth year students.

### Procedures

Participants were invited to participate in an anonymous, online survey on how COVID-19 has impacted their psychological state and behaviors. As Winter recess was in session during the data collection period of this study due to delayed start of the Spring semester, participants were surveyed through an online survey platform (“SurveyStar,” Changsha Ranxing Science and Technology, Shanghai, China). After giving informed consent, participants were directed to the psychological measurements.

### Measures

#### Epidemic Rumination

Epidemic rumination was measured via a 10-item COVID-19 abridged version of the Ruminative Response Scale [RRS; (51, 52)]. Prior studies using the RRS in Chinese samples have shown good reliability and validity [e.g., (53, 54)]. The current scale was comprised of two dimensions: (1) reflective pondering (e.g., “I often think about why COVID-19 turned out the way it did”) and (2) brooding (e.g., “I often go someplace alone to think about my feelings”). Each item was scored from 1 (*not at all true*) to 5 (*definitely true*),  $\alpha = 0.76$ . Higher mean scores indicated greater levels of epidemic rumination. Confirmatory factor analysis (CFA) indicated acceptable fit, CFI = 0.92, TLI = 0.90, RMSEA = 0.08, SRMR = 0.05. See **Appendix** for all items.

#### Resilience

Resilience was measured via the Chinese version of the 10-item Connor-Davidson Resilience Scale (55), originally developed by Campbell-Sills and Stein (56). Prior use of this scale among Chinese participants showed good reliability and validity [e.g.,

(57)]. The scale was composed of ten items (e.g., “Able to adapt to change”),  $\alpha = 0.94$ . All items were scored from 0 (*never*) to 4 (*always*). Higher mean scores indicated higher levels of resilience.

#### Fatigue

Fatigue was measured via the Chinese version of the Fatigue Assessment Scale (58), originally developed by Michielsen et al. (59). This scale has previously been used with Chinese participants with good reliability and validity [e.g., (58)]. The scale was composed of twenty items (e.g., “I have problems thinking clearly”) and each item was scored from 1 (*never*) to 5 (*always*),  $\alpha = 0.86$ . Higher mean scores indicated greater levels of fatigue.

#### Depressive Symptoms

Depressive symptomology was measured via the Chinese version of the Center for Epidemiological Studies Depression Scale (60), originally developed by Radloff (61). Prior use of this scale among Chinese participants [e.g., (58, 62, 63)] have shown good reliability and validity. The scale was composed of twenty items and includes four dimensions: (1) depressed affect (e.g., “I felt lonely”), (2) positive affect (e.g., “I felt hopeful about the future”), (3) psychosomatic retardation (e.g., “I could not get ‘going’”), and (4) interpersonal relationships (e.g., “People were unfriendly”),  $\alpha = 0.95$ . Each item was scored from 1 (*not at all true*) to 5 (*definitely true*). Higher mean scores indicated greater levels of depressive symptoms.

## RESULT

### Descriptive Statistics

Means, standard deviations, and Pearson correlations are given in **Table 1**. As expected, epidemic rumination was positively related to fatigue and depressive symptoms, and negatively related to resilience. Resilience was strongly negatively related to both fatigue and depressive symptoms. Fatigue was strongly positively related to depressive symptoms.

## Epidemic Rumination and Resilience on Depressive Symptoms: The Mediating Effect of Fatigue

Structural equation modeling (SEM) through Mplus 8.3 (64) was used to analyze the mediating role of fatigue in the effects of epidemic rumination and resilience on depressive symptoms as well as the interaction between epidemic rumination and resilience on fatigue (Figure 2). The proposed model showed great fit (RMSEA = 0.05, SRMR = 0.04, CFI = 0.98, TLI = 0.98) based on field threshold standards (65, 66). Epidemic rumination was positively related to fatigue [ $\gamma = 0.11, t = 2.39, p = 0.017, 95\% \text{ CI} = (0.012, 0.176)$ ] while resilience was negatively related to fatigue [ $\gamma = -0.42, t = -11.52, p < 0.001, 95\% \text{ CI} = (-0.426, -0.290)$ ], supporting Hypotheses 1a and 2a. Moreover, epidemic rumination and resilience positively interacted in their relation to fatigue [ $\gamma = 0.07, t = 2.19, p = 0.029, 95\% \text{ CI} = (0.016, 0.154)$ ]. Fatigue was a strong positive correlate of depressive symptoms [ $\gamma = 0.58, t = 19.12, p < 0.001, 95\% \text{ CI} = (0.619, 0.801)$ ], supporting Hypotheses 4a-b that fatigue mediates the effect of epidemic rumination and resilience on depressive symptoms. Results also showed that even after controlling for fatigue, depressive symptomology was directly predicted by epidemic rumination [ $\gamma = 0.16, t = 5.15, p < 0.001, 95\% \text{ CI} = (0.110, 0.242)$ ] and resilience [ $\gamma = -0.23, t = -10.073, p < 0.001, 95\% \text{ CI} = (-0.426, -0.290)$ ], supporting Hypotheses

1b and 2b and suggesting that the mediation effect of fatigue was only partial.

The interaction effect is visually outlined in Figure 3 as a simple slopes plot with calculated gamma coefficients at  $-1 \text{ SD}$  and  $+1 \text{ SD}$  from the mean of resilience. For students with low resilience, the impact of epidemic rumination on fatigue was not significant ( $\gamma = 0.03, t = 1.18, p > 0.05$ ) compared to students with high resilience, where the impact of epidemic rumination on fatigue was significant ( $\gamma = 0.18, t = 5.54, p < 0.001$ ). While this interaction effect was significant, the direction of the contrasted with the hypothesis, and thus Hypothesis 3 was rejected.

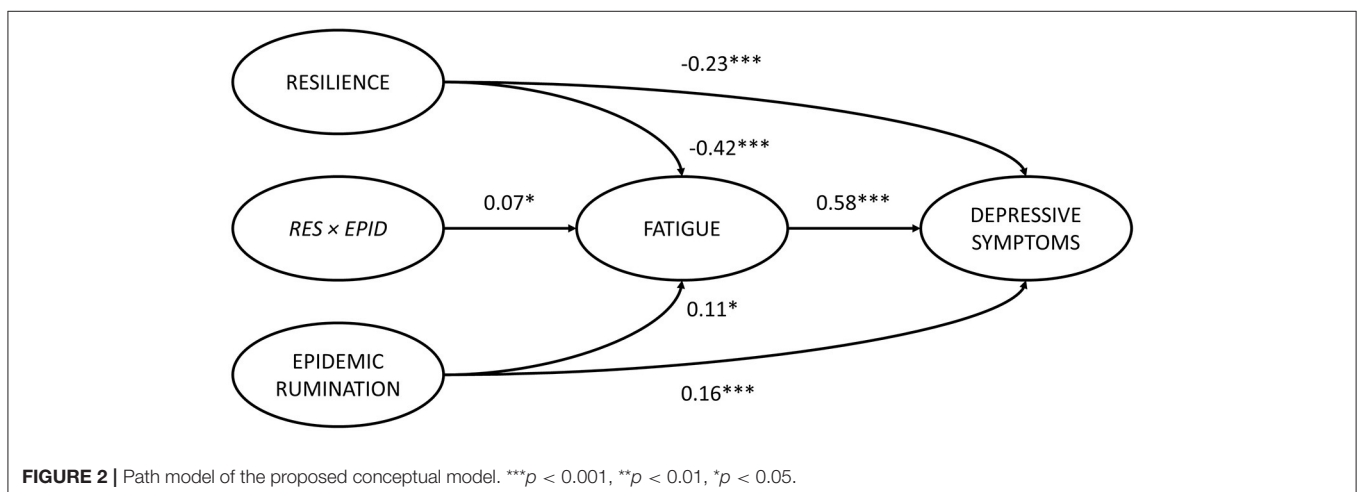
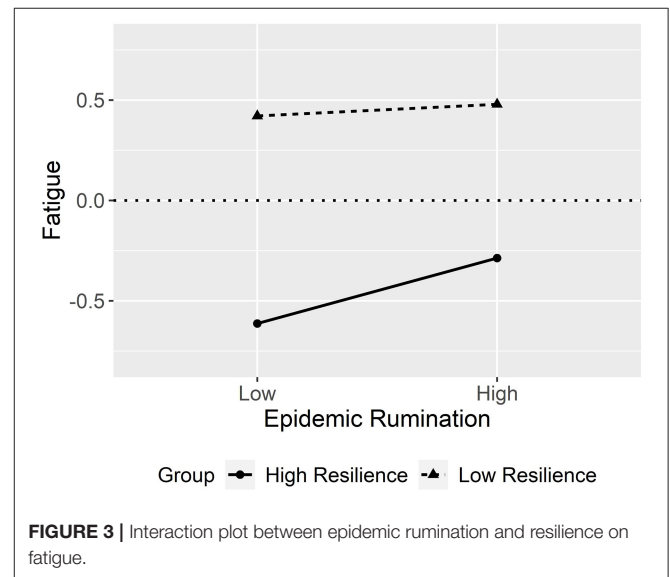
### Considering Alternative Models

Although results have generally provided strong support for our current model, several possible alternative models were also considered and tested given the cyclical nature of mental health outcomes and maladaptive behaviors (Table 2).

**TABLE 1** | Means, standard deviations, and correlations of the main study variables.

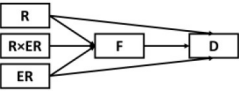

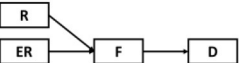
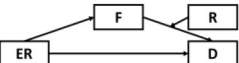
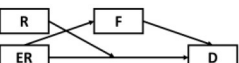
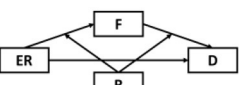
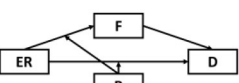
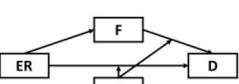
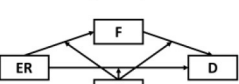

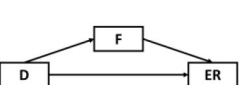
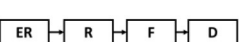
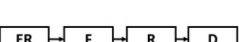
	<i>M</i>	<i>SD</i>	1	2	3	4
1. Epidemic rumination	2.97	0.54	–			
2. Fatigue	2.59	0.50	0.13***	–		
3. Depression	1.68	0.63	0.28***	0.65***	–	
4. Resilience	3.63	0.61	–0.14***	–0.40***	–0.74***	–

*N* = 1,293; \*\*\**p* < 0.001.





**TABLE 2** | Comparison of alternative models.

Model	Diagram	RMSEA	CFI	NNFI	SRMR
Proposed model		0.05	0.98	0.97	0.04
Alternative model I		0.05	0.97	0.96	0.05
Alternative model II		0.06	0.98	0.97	0.05
Alternative model III		0.10	0.91	0.98	0.12
Alternative model IV		0.10	0.91	0.88	0.11
Alternative model V		0.09	0.90	0.88	0.08
Alternative model VI		0.09	0.91	0.89	0.07
Alternative model VII		0.09	0.89	0.87	0.11
Alternative model VIII		0.08	0.90	0.88	0.08
Alternative model IX		0.13	0.90	0.87	0.09
Alternative model X		0.13	0.91	0.88	0.09
Alternative model XI		0.10	0.92	0.90	0.09
Alternative model XII		0.10	0.93	0.90	0.09

ER, epidemic rumination; F, fatigue; D, depressive symptoms; R, resilience.

Alternative Models I-II were direct derivatives of the proposed conceptual model but made strong assumptions that depressive symptoms were not directly preceded by resilience (Model I) and epidemic rumination (Model II). Both alternative models yielded comparable fits but ultimately did not allow for incorporating past findings that implicate direct effects of rumination [e.g., (15, 25)] and resilience on depressive

symptoms [e.g., (30, 32, 35, 36)]. Further, consistent with prior evidence of resilience as a moderating trait [e.g., (26, 67)], Alternative Models IV-VIII were also examined in which rumination was tested as a moderator at multiple paths. However, none of these competing models yielded comparatively good or better fits.

Lastly, four models that restructured the order of variables were considered. Although epidemic rumination may be a risk factor for fatigue and depressive symptoms, prior evidence suggests that possibility of the opposite trend. Specifically, fatigue may hinder self-control (47), possibly leading to greater rumination and subsequently depressive symptoms [(51, 68) Alternative Model IX]. Similarly, depressive symptoms and rumination may also be cyclical in which depressive symptoms may induce greater focusing on negative emotions (24) that lead to both fatigue and rumination (Alternative Model X). Further, while resiliency is often depicted as a stable individual trait, recent findings have alluded that one's resiliency may be malleable in response to varying degrees of risk [e.g., (69)], as also possibly evidenced by the negative correlations of epidemic rumination and fatigue on resilience. Thus, Alternative Models XI-XII were examined to test whether epidemic rumination posed a direct effect on resilience or indirect effect via fatigue. However, all competing models yielded poorer fits in comparison to the proposed model. Hence, the proposed model best yielded empirical support for the conceptual path model.

## DISCUSSION

Sudden public health emergencies risk serious social harm to the affected populace (70), particularly for college students who may be ill-equipped to adaptively manage the sudden stress of emergencies (71–73). This current research explored the effects of epidemic rumination and resilience on college students' depressive symptoms, the interaction between rumination and resilience, as well as the mediating role of fatigue. In this study, epidemic rumination was positively related to depressive symptoms, in line with several studies also documenting a positive link between the two constructs [e.g., (4, 17, 18, 58, 74)]. Similarly, resilience was negatively related to depressive symptoms, consistent with prior studies [e.g., (30, 31, 75)]. However, in examining the direct effects, fatigue was the strongest predictor of depressive symptoms, eclipsing the effect sizes of the two aforementioned predictors in comparison. This is not entirely unexpected, given that psychomotor retardation has long been a known sign of depression (76) and psychological and physiological exhaustion are close sister constructs. From the perspectives of the psychological resources theory (47) and cognitive load theory (77), fatigued individuals, depleted of psychological resources, may struggle in their fight against the onset of stress consequences when faced with prolonged negative emotional or psychological states, increasing the risk of depression (48, 49, 58, 78).

It is worth noting that in this study, the measurements used were meant to conceptually capture different components

of a similar construct; fatigue measured one's extent of mental and psychological tiredness and exhaustion compared to psychomotor retardation that captures the physiological symptomatology of depleted motivation in clinical depression. However, the two constructs remain fairly similar in their conceptualization and future research may seek to further parse them apart by specifying the target of the fatigue (i.e., fatigue over COVID-19 and its related events). For instance, the psychological and physiological consequences of prolonged exposure to COVID-19 information is popularly being referred to as the "COVID fatigue." It is currently unclear whether target-specific fatigue may yield different results. However, should there be strong theoretical or empirical reasoning to suggest that "COVID fatigue" may result in greater consequences, such as evidence of avoidant coping specific to COVID-19 stressors, then future research may be warranted to examine this link.

In predicting fatigue, both resilience and epidemic rumination were significant correlates. Resilience was a strong negative correlate of fatigue whereas epidemic rumination was a small positive correlate of fatigue. In both cases, the results generally supported prior findings [e.g., (79)]. What was interesting, and somewhat counterintuitive, however, was the positive interaction between epidemic rumination and resilience. This result was in direct contradiction to our hypothesized direction that high resiliency would buffer the effect of rumination on fatigue. One explanation may be that for those with very high levels of rumination, the negative effects were beyond the capacity of their ability to adequately cope. Indeed, while the conventional view has been that resilience serves as a protective role against difficulties, traumas, and tragedies (26, 67, 80), there has been a notable contention of scholars who have challenged this view, arguing that the benefits of resilience wanes at the highest levels of risk (69, 81, 82). For instance, Vanderbilt-Adriance and Shaw (69) suggested that the efficacy of protective factors can be lost when the counteracting risk surpasses a certain threshold. Thus, individuals who are highly resilient, but also ruminative, may continue to expend cognitive resources in spite of their inability to manage their stressors, exacerbating what may be an inevitable state of exhaustion. This may be in comparison to less resilient but ruminative individuals who may prefer the path of least resistance and simply let rumination work its course on inducing "normative" fatigue.

Although the interaction effect was notably small, fairly inconspicuous small effects may still yield long-term practical significant ramifications (83). Thus, future development and implementation of any interventions in building resilience may need to be more cognizant about possible unintended consequences toward those under high risk. Lastly, fatigue partially mediated the effects of epidemic rumination and resilience on depressive symptoms. This is significant in that mitigating physiological and psychological exhaustion may improve mental health outcomes. However, given that both epidemic rumination and resilience still yielded significant direct effects on depressive symptoms, targeted interventions may need to address several factors to observe large improvements in one's mental health outcomes.

## Significance and Implications of Research

While the current study did not directly examine the efficacy of any intervention strategies, the results provide several implications for what future studies may need to address. Firstly, it may be beneficial for college students to learn specific coping strategies. Given that COVID-19 is largely outside one's immediate control, certain active coping strategies that seek to address the source of the problem may not be practical or feasible. We also hesitate in advocating for any coping strategies that involve diverting one's attention from COVID-19 related contents as such endeavors may only serve to teach and promote avoidant coping. Thus, future research may seek to examine if strategies that address one's subjective response to stressors (e.g., cognitive reappraisal) prove fruitful in mitigating the onset of fatigue and depressive symptoms. Secondly, interventions that help college students to ensure adequate sleep, improve sleep quality, and engage in non-exhaustive exercise may hold potential benefits by reducing fatigue. Lastly, based on our findings that high resilience may not always yield desired outcomes, it may be necessary for interventions to first target reducing rumination prior to attempting to boost one's resilience.

## Limitations

Several limitations should be considered in interpreting the results. First, the cross-sectional and correlation study designs limit the extent to which causal inferences may be made. While alternative models were examined to compare contrasting theoretical paths and further justify the model examined, future studies should nonetheless seek to utilize longitudinal or experimental designs, as allowed, to further probe at the causality of the paths examined in this study. Secondly, the participants in the sample used were entirely from Chinese populations and may not generalize beyond this social ecology. Given that each country, and even the local clusters within geographical locations, may experience the COVID-19 pandemic differently, it is necessary for additional research to be conducted across cultures to examine the robustness of the model. Thirdly, all measures were examined via self-report scales. While statistical and process controls against common-methods bias were used (see **Appendix** for further details), future research may opt to incorporate mixed methods designs (e.g., quantitative with qualitative data, psychological with physiological measurements) to further enrich the findings from this study.

Fourthly, depressive symptomatology may not necessarily translate to clinical depression. As was shown in **Table 1**, the mean score of depressive symptoms was far below the midpoint of the scale and most participants did not report the highest levels of symptoms to typically constitute clinical depression. Thus, while the analyses used in this study examine *relations* between variables, and thus are not affected by the location of the means, future research may seek to pursue replication studies on clinically diagnosed samples. Lastly, the current study only examined fatigue as a mediating variable. As evidenced by prior studies, several other mediating variables may be relevant as well. Future studies may seek to examine a more comprehensive model in explaining the antecedents of depressive symptoms.

## CONCLUSION

The current study provides novel insight into examining the roles of epidemic rumination, resilience, and fatigue on depressive symptoms. It is imperative to continue monitoring the well-being of college students as they reach key developmental milestones amidst an uncertain social ecology. While focusing intervention strategies on fatigue may yield the largest, direct benefit, attention should also be given to mitigating ruminative tendencies as well as promoting resiliency. This may particularly be important given the current finding that only promoting one factor in the absence of the other may result in exacerbating fatigue for select individuals.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Jiangxi Normal University. The

patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

BY acted as the Principal Investigator and oversaw the study in its inception to completion. BY, XZ, ML, XW, and QY were responsible for data collection, writing the manuscript, and conceptualizing the models. HI contributed to the reconceptualization of the study models and rewriting of the paper in subsequent drafts after the initial submission. All authors contributed to the article and approved the submitted version.

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## APPENDIX

### Addressing Common-Methods Bias

To control for common-method bias stemming from self-report measures, several steps were undertaken. To provide procedural control, participants' responses were anonymous and were free to withdraw from the study at any time. Further, it was stressed that there were no "right" or "wrong" answers to the measures. To provide statistical control, Harman's single-factor test was used. Exploratory factor analysis was run for all items of variables with rotated principal component and 13 factors were extracted with eigenvalues  $< 1$ . The first factor accounted for 38.58%, suggesting no significant common-method bias in the data (84).

### The Adapted COVID-19 Ruminative Response Scale

1. I often think about what causes COVID-19.
2. I often analyze the outbreak of COVID-19 and try to understand why I am depressed.
3. I often think about why COVID-19 turned out the way it did.
4. I often go away by myself and think about why I feel this way.
5. I often write down what I am thinking about and analyze it.
6. I often think about the COVID-19 epidemic, wishing it will get better.
7. I often wonder why I have these problems that others don't.
8. I often wonder why I can't handle things better.
9. I often analyze my personality to try to understand why I am depressed.
10. I often go someplace alone to think about my feelings.

\**Note:* English translations are given but has not been empirically tested in its English form.



# COVID-19, Coronavirus, Wuhan Virus, or China Virus? Understanding How to “Do No Harm” When Naming an Infectious Disease

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When labeling an infectious disease, officially sanctioned scientific names, e.g., “H1N1 virus,” are recommended over place-specific names, e.g., “Spanish flu.” This is due to concerns from policymakers and the WHO that the latter might lead to unintended stigmatization. However, with little empirical support for such negative consequences, authorities might be focusing on limited resources on an overstated issue. This paper empirically investigates the impact of naming against the current backdrop of the 2019–2020 pandemic. The first hypothesis posited that using place-specific names associated with China (e.g., Wuhan Virus or China Virus) leads to greater levels of sinophobia, the negative stigmatization of Chinese individuals. The second hypothesis posited that using a scientific name (e.g., Coronavirus or COVID-19) leads to increased anxiety, risk aversion, beliefs about contagiousness of the virus, and beliefs about mortality rate. Results from two preregistered studies [ $N_{(Study\ 1)} = 504$ ;  $N_{(Study\ 2)} = 412$ ], conducted across three countries with the first study during the early outbreak (April 2020) and the second study at a later stage of the pandemic (August 2020), found no evidence of any adverse effects of naming on sinophobia and strong support for the null hypothesis using Bayesian analyses. Moreover, analyses found no impact of naming on anxiety, risk aversion, beliefs about contagiousness of the virus, or beliefs about mortality rate, with mild to strong support for the null hypothesis across outcomes. Exploratory analyses also found no evidence for the effect of naming being moderated by political affiliation. In conclusion, results provide no evidence that virus naming impacted individual’s attitudes toward Chinese individuals or perceptions of the virus, with the majority of analyses finding strong support for the null hypothesis. Therefore, based on the current evidence, it appears that the importance given to naming infectious diseases might be inflated.

**Keywords:** psychology of naming, COVID-19, Wuhan Virus, coronavirus, pandemic, public messaging, China Virus, sinophobia

“Having a name matters to prevent the use of other names that can be inaccurate or stigmatizing.”  
—Tedros Ghebreyesus, Director-General, World Health Organization (WHO, 2020a).

“We’ve seen certain disease names provoke a backlash against members of particular religious or ethnic communities, create unjustified barriers to travel, commerce and trade, and trigger needless slaughtering of food animals. This can have serious consequences for people’s lives and livelihoods.”  
—Keiji Fukuda, Assistant Director-General, World Health Organization (WHO, 2020c).

## INTRODUCTION

In the face of a pandemic, one of the key decisions that scientists and policymakers face is how to name the infectious disease. While this decision might seem mundane relative to other urgent matters, international bodies, such as the World Health Organization (WHO) have expressed concern about potential unintended negative consequences of disease names (WHO, 2020a,b). The primary concern is that place-specific names, such as “Spanish Influenza” or “Middle East Respiratory Syndrome” will lead to the stigmatization of individuals associated with this region (WHO, 2020a). Thus, in 2015, the WHO released a report listing what they see as best practices for naming new human infectious diseases to “minimize the unnecessary negative impact of disease names” (Fukuda et al., 2015; WHO, 2020b). However, it generally takes significant deliberation for the WHO to officially sanction a name, by which point alternative names often have arisen in the public lexicon.

The 2020 pandemic is a perfect example of this name multiplicity, with several different monikers emerging. The first name that unofficially started floating around in the media since December 2019 is *Wuhan Virus*. This is a place-specific name derived from the likely emergence of the virus in Wuhan, China. As mentioned above, WHO guidelines warn against such place-specific names (Fukuda et al., 2015; WHO, 2020b), and this name has received negative media attention for its possible impacts on stigmatization and xenophobia (Board, 2020; Gabbatt, 2020). The second name to emerge was *Coronavirus*, a scientific but technically “inaccurate” name referring to the family of viruses. Nevertheless, this continues to be the most popular name in Google search trends (Google Trends, 2020). A third name, “COVID-19,” was released by WHO on February 11, 2020, in line with its guidelines (WHO, 2020b)<sup>1</sup>. Since then, the WHO, many governments, and media outlets have actively sought to instill this name in the public discourse. A fourth name considered is “China Virus” (WHO, 2020a). Similar to Wuhan Virus, this name has been criticized in the media for its potential to promote xenophobia and official briefings using this name have later been retracted (Trump and Donald, 2020). However, despite the rich media discussion, there is little empirical evidence on the psychological impacts of virus naming. To help address this question, we investigate the effects of names on people’s perceptions including sinophobia, anxiety, risk aversion, and mortality and contagiousness beliefs.

In the case of the current pandemic, the primary contrast is between the scientific names (COVID-19 or Coronavirus) and the place-specific names (Wuhan Virus or China Virus). Empirical research suggests that names play an important role in how we perceive phenomena (Wood, 1991; Waytz et al., 2014), although findings have been somewhat mixed. For example, in the health domain, studies have found that both drug (e.g., “opioid” vs. “narcotic”) and illness names (e.g., “gout” vs. “urate

crystal arthritis”) significantly impact patient and public reactions (Mangione and Crowley-Matoka, 2008; Petrie et al., 2018). However, in the domain of naming natural disasters, evidence has been inconclusive, with initial findings suggesting that female-named hurricanes led to significantly more deaths because they were erroneously perceived as less dangerous (Jung et al., 2014), but a reanalysis of the data found no support for this naming effect (Malter, 2014). Thus, the psychological effect of naming is very much an open topic for research.

The first research question this paper investigates is whether using a place-specific name leads to increased xenophobia toward individuals from that country. As discussed, the names Wuhan Virus and China Virus are generally shunned in media circles, and their use has been anecdotally linked to acts of violence against ethnically Chinese individuals living abroad (Al Jazeera, 2020; Board, 2020; Gabbatt, 2020). Psychologically, this is attributed to a process by which individuals associate their negative views toward the pandemic with a specific population (i.e., Chinese) and subsequently develop negative views about that population (Fukuda et al., 2015). We empirically test this possibility, exploring the effects of naming on *sinophobia*, the negative stigmatization of Chinese individuals. More specifically, if the above reasoning is correct, we would expect to find more negative views of Chinese people (i.e., *sinophobia*) when the pandemic is referred to by a place-specific name, i.e., Wuhan Virus or China Virus.

Moreover, we examine whether political affiliation moderates this naming effect. The theoretical rationale for such a moderation lies in political affiliation being related to ingroup favoritism, with conservatives showing stronger ingroup bias than liberals during times of threat (Perry et al., 2018). This ingroup favoritism could lead to increased *sinophobia*, specifically when the pandemic is referred to by place-specific names.

The second research question this paper investigates is the potential negative effect of using the official scientific name on attitudes toward the pandemic. Research has found that scientific concepts can lead to greater feelings of stress and increased aversion (Mallow, 1994). Further, scientific names are also generally not in the common lexicon and devoid of any human association, which could result in individuals feeling greater distrust of the phenomenon (Waytz et al., 2014). If this reasoning is correct, we would expect to find more negative perceptions of the pandemic when it is referred to with its scientific name, COVID-19 or Coronavirus, as compared to the place-specific names.

In sum, this paper tests two hypotheses with respect to naming: (a) that the place-specific names (Wuhan Virus/China Virus) lead to increased *sinophobia* relative to other names (Hypothesis 1) and (b) that the scientific names (COVID-19/Coronavirus) lead to more negative attitudes—in the form of increased levels of anxiety, risk aversion, and beliefs about contagiousness and mortality—relative to other names (Hypothesis 2). Also, we explore political affiliation as a potential moderator of this effect. Two separate studies were conducted during the early outbreak of the pandemic (April 2020) and at its later stages (August 2020). The entire set of study materials

<sup>1</sup>While COVID-19 is technically the name for the disease caused by the virus called SARS-CoV-2, WHO prefers to refer to the virus as “the virus responsible for COVID-19” or “the COVID-19 virus” to avoid the unintended hostility toward certain populations in Asia (Hong Kong is referred to “HKSAR” or Hong Kong Special Administrative Region).



and analysis plans for both studies were pre-registered before data collection (see [osf.io/9s4jk](https://osf.io/9s4jk)). Given the global nature of the pandemic, we collected data from three countries—US, Canada, and India—in Study 1 ( $N = 504$ ) investigating the names Wuhan Virus, COVID-19, and Coronavirus and two countries—US and India—in Study 2 ( $N = 412$ ) adding the name China Virus.

## STUDY 1

### Materials and Methods

In the first study, we obtained three samples from the United States of America (US), Canada, and India. All participants were recruited through the online surveying platform Amazon Mechanical Turk. Following the best practices in ensuring participant quality (Keith et al., 2017), we screened for participants who (a) had completed at least 50 previous surveys and (b) had a past participant approval rating of 95% and above.

A demographic breakdown across the total sample ( $N = 504$ ) shows a mean age of 36.09 ( $SD = 10.71$ ), 29.96% female, 43.06% Caucasian (38.69% Indian, 7.34% Black, 1.98% Chinese, 8.93% Other), and 52.18% having an undergraduate degree (14.09% lower qualifications and 33.73% higher qualifications).

The study procedure was identical across all three samples. Participants first read an article describing the spread of the pandemic and then answered questions relating to (a) state anxiety, (b) domain-specific risk aversion, (c) beliefs about contagiousness and mortality of the virus, and (d) attitudes toward Chinese individuals.

We manipulated one factor, virus name, across three levels: COVID-19, Coronavirus, and Wuhan Virus. We did so by using the respective name in the article (an example is shown in **Figure 1**) and in the following questions mentioning the virus (e.g., “Out of 100 people who are infected with the (COVID-19, Coronavirus, Wuhan Virus) how many do you think will die as a result of catching the virus?”). More details on the methods, manipulations, measures, pre-registered exclusions, and analysis plan are available on OSF (see [osf.io/9s4jk](https://osf.io/9s4jk)).

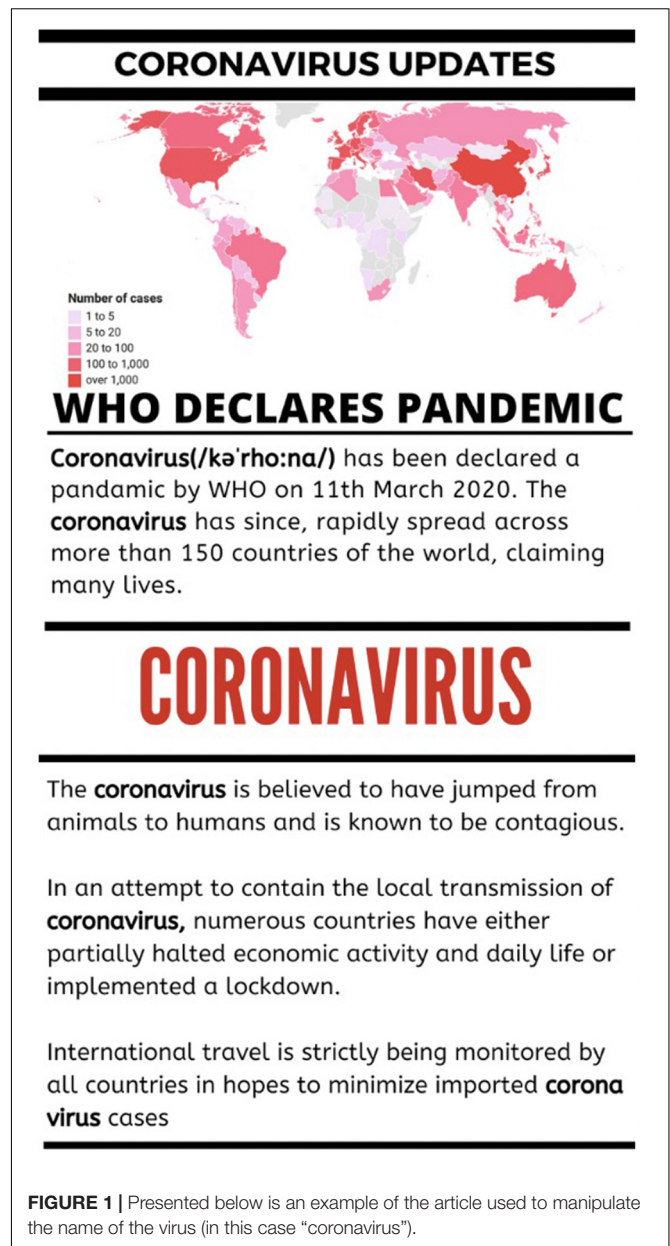
## Measures

### Anxiety

We measured state anxiety after reading the article using the PANAS-X fear subscale (Watson and Clark, 1999). Participants rated how well five different emotion words (nervous, scared, frightened, jittery, and shaky) characterized their current emotional state on a scale from 1 (“strongly disagree”) to 7 (“strongly agree”) [Cronbach's alpha ( $\alpha$ ) = 0.90].

### Domain-Specific Risk

We used an adaptation of the DOSPERT scale (Blais and Weber, 2006) with scenarios that relate specifically to the current pandemic to measure risk aversion. This scale (see **Appendix**) attempted to capture perceived risk related to different activities in the time of the pandemic. The scale demonstrated reasonable internal consistency ( $\alpha = 0.85$ ).



### Beliefs About Contagiousness and Mortality

We used two one-item measures developed by Fetzer et al. (2020) to measure beliefs about (a) how contagious the virus was and (b) how many out of 100 people infected would die from the virus. Answers ranged from 0 to 100 on both scales. Akin to the original paper, these responses were heavily skewed and thus all responses were logged (Fetzer et al., 2020).

### Sinophobia

To measure prejudice toward Chinese individuals, we adapted an explicit measure developed by Payne et al. (2010) to measure prejudice against black individuals. This included a measure of perceived warmth along with feelings of admiration and sympathy. Items were combined to form a single measure

of sinophobia ( $\alpha = 0.68$ ). We opted for an explicit measure, instead of an implicit measure, based on findings that explicit measures provide adequate assessments of prejudice (Axt, 2018). This measure was standardized with positive scores indicating sinophobia.

### Political Affiliation

Political affiliation was measured across all samples using a one-item five-point self-reported measure developed by McAdams et al. (2008), which asked participants: "How would you define yourself on the following scale in terms of your political orientation?" (1 = very liberal, 2 = liberal, 3 = middle of the road, 4 = conservative, and 5 = very conservative). This measure was then simplified into a categorical variable to create a clearer contrast between liberal (1) vs. middle of the road (2) vs. conservative (3).

### Education Level

Level of education was measured based on the highest level of qualification received by the participant: high school diploma, bachelor's degree, and postgraduate degree (master's/doctoral degree). This was coded as a categorical variable (1–3).

### Age and Gender

Demographic variables were measured using single items for age (18–100 +), gender (female = 0; male = 1), and education level (high school diploma = 1; bachelor's degree = 2; postgraduate degree = 3).

### Exclusions

Exclusions were applied in line with the OSF pre-registration. First of all, given the relatively subtle nature of the intervention, we excluded participants who failed an instructional manipulation check (Oppenheimer et al., 2009). Second, given the potential impacts on the outcome variables of interest, we excluded individuals who (a) had the virus, (b) were in physical contact with someone who had the virus, or (c) had close family and friends who had the virus. These exclusions did significantly cut the sample size (a total of 245 participants were excluded).

### Analysis Plan

We followed the analysis plan in line with the OSF pre-registration. We compared means across conditions (COVID-19 vs. Coronavirus vs. Wuhan Virus) using analysis of variance (ANOVA). We followed up with Bayesian analyses to evaluate the null hypothesis of no naming effect. Please note that all the Bayesian factors reported in this paper compare the likelihood of the data occurring under the alternative hypothesis vs. the null hypothesis ( $BF_{10}$ ). For example, a Bayes Factor of 10.00 indicates that the data are 10 times more likely to occur under the alternative hypothesis compared to the null hypothesis; alternatively, a Bayes Factor of 0.1 indicates that the data are 10 times more likely to occur under the null hypothesis compared to the alternate hypothesis (Jarosz and Wiley, 2014). These analyses were conducted using JASP with a standard unbiased Cauchy prior using the JASP default width of 0.5 (JASP Team, 2020). See Etz and Vandekerckhove (2018) and Wagenmakers et al. (2018)

for more information on interpretation for Bayes analyses. Finally, exploratory analyses, i.e., not formally pre-registered, explored the moderating effects of political affiliation.

## Results

Descriptive statistics and correlations are provided in **Table 1**.

### Sinophobia

We compared means across conditions for sinophobia using the three measures outlined by Payne and colleagues (Payne et al., 2010): warmth, admiration, and sympathy. We found no differences across conditions on sinophobia, with strong support for the null hypothesis [ $F(2, 501) = 0.78, p = 0.46, \eta = 0.00$ ; *Bayes Factor*<sub>( $BF_{10}$ )</sub> = 0.047]. In sum, in evaluating Hypothesis 1, there was strong evidence for the null hypothesis, i.e., place-specific naming did not increase sinophobia.

Next, we conducted exploratory analyses to see if any differences emerged depending on political affiliation (liberal vs. conservative;  $M = 1.96, SD = 0.89$ ). Analyses found no evidence of a significant interaction with condition with very strong support for the null hypothesis,  $F(4, 489) = 0.71, p = 0.59, \eta = 0.01$ ;  $BF_{10} = 0.000842$ . This suggests that political affiliation did not moderate sinophobic responses to different virus names.

### Anxiety, Risk Aversion, and Beliefs About the Virus

First, we compared means across the three naming conditions for anxiety, risk aversion and beliefs about contagiousness/mortality separately. Below, we report results pooled across the three samples (US, Canada, and India); note that similar patterns were seen within country samples (see **Table 2**). We found no main effect of naming on anxiety, with Bayesian analyses showing very strong support for the null hypothesis,  $F(2, 501) = 0.05, p = 0.95, \eta = 0.00$ ;  $BF_{10} = 0.023$ . Similarly, no significant differences emerged for the measure of domain-specific risk aversion with mild support for the null,  $F(2, 501) = 1.77, p = 0.17, \eta = 0.01$ ;  $BF_{10} = 0.119$ . Next, we detected a marginal effect on beliefs about contagiousness although Bayesian analyses still found weak support for the null,  $F(2, 501) = 2.66, p = 0.07, \eta = 0.01$ ;  $BF_{10} = 0.271$ . Finally, there was no support for an effect on

**TABLE 1** | Summary statistics and correlations for Study 1. Presented below are the means, standard deviations, and correlations for all variables across the entire sample.

	M	S.D.	Min	Max	1	2	3	4	5
Anxiety	2.99	1.11	1	5	[0.90]				
Risk aversion (DOSPERT)	5.50	0.92	1	7	0.43***	[0.85]			
Contagious beliefs (logged)	2.47	1.13	0	4.61	0.25***	0.27***			
Mortality beliefs (logged)	2.02	1.03	0	4.61	0.35***	0.23***	0.34***		
Sinophobia	0.17	0.97	-2.00	2.33	-0.04	0.12**	0.19***	-0.04	[0.68]
Political affiliation	1.97	0.88	1	3	0.22***	-0.01	-0.04	0.12**	-0.07

*Alpha coefficients for composite measures are provided in brackets. \*\*\* $p < 0.001$ , \*\* $p < 0.01$ .*

**TABLE 2** | Effect of naming on individual perceptions and beliefs for Study 1. Presented below are the results of one-way ANOVAs run on each of the study variables across the three samples and the entire sample.

Sample	Statistics	Anxiety	Risk aversion (DOSPERT)	Contagiousness beliefs <sub>(logged)</sub>	Mortality beliefs <sub>(logged)</sub>	Sinophobia	No. of observations (N)
US	df	2	2	2	2	2	212
	F	0.31	2.22	1.89	0.16	1.83	(77, 72, 63)
	Prob > F	0.73	0.11	0.15	0.85	0.16	
	$\eta$	0.00	0.02	0.02	0.00	0.02	
Canada	df	2	2	2	2	2	98
	F	0.19	0.35	0.08	0.28	0.49	(33, 34, 31)
	Prob > F	0.83	0.70	0.92	0.77	0.62	
	H	0.00	0.01	0.00	0.00	0.01	
India	df	2	2	2	2	2	194
	F	0.38	1.45	1.52	0.32	0.45	(67, 66, 61)
	Prob > F	0.68	0.24	0.22	0.72	0.64	
	$\eta$	0.00	0.01	0.01	0.00	0.00	
Overall	df	2	2	2	2	2	504
	F	0.05	1.77	2.66	0.03	0.78	(177, 172, 155)
	Prob > F	0.95	0.17	0.07	0.97	0.46	
	$\eta$	0.00	0.01	0.01	0.00	0.00	

Brackets under N show no. of observations per manipulation condition (COVID, Coronavirus, Wuhan Virus).

mortality beliefs, with very strong support for the null,  $F(2, 501) = 0.03$ ,  $p = 0.97$ ,  $\eta = 0.00$ ;  $BF_{10} = 0.023$ .

## STUDY 2

The result of the first study provided consistent support for a null effect of virus naming on sinophobia and attitudes toward the virus. To further corroborate these results, which ran counter to our pre-registered hypotheses, a follow-up study was conducted. The aims of this study were twofold. First, the study sought to address whether the impacts of naming perhaps only emerge after increased exposure to all of the names by examining the same hypotheses at a second time point much later after the initial outbreak (August 2020). Additionally, given the null effects of the place-specific name “Wuhan Virus” on impacting sinophobia, we sought to investigate whether using a name more explicitly linking China with the pandemic, i.e., “China Virus,” might impact sinophobia. As in the previous study, all materials and analysis plans were pre-registered at [osf.io/9s4jk](https://osf.io/9s4jk).

## Materials and Methods

In the second study, we obtained samples from the US and India. All participants were again recruited through the online surveying platform Amazon Mechanical Turk with the same pre-qualifications as in Study 1 for ensuring participant quality. A demographic breakdown across the total sample ( $N = 412$ ) shows a mean age of 37.63 ( $SD = 12.48$ ), 37.62% female, 48.06% Caucasian (39.32% Indian, 7.04% Black, 1.21% Chinese, 4.37% Other), and 58.01% having an undergraduate degree (14.08% lower qualification and 27.91% higher qualification).

The study procedure was identical to Study 1 with the addition of another moniker (China Virus) as the fourth experimental condition and a different measure of coronavirus-specific risk perceptions. At the time of conducting this

second study, a scale for coronavirus specific risk perceptions had been validated by Dryhurst et al. (2020). Therefore, we decided to opt for the validated measure to provide consistent evidence across two scales and use a psychometrically valid scale. A forced response type manipulation check at the end of the survey asked participants to report the name of the virus as seen in the manipulation. A chi-square test indicated a significant relationship between the manipulation check and the manipulated names [ $\chi^2(12, N = 412) = 1059.12$ ,  $p < 0.001$ ], indicating that most people gave the correct response and that the manipulation was effective. After the study, participants were debriefed and thanked for their participation.

## Measures

All measures from Study 1 were included in this study and multi-item scales showed similar internal consistencies (anxiety,  $\alpha = 0.94$ ; sinophobia,  $\alpha = 0.68$ ).

### Coronavirus-Related Risk Perceptions

A modified version of a coronavirus related risk perceptions scale (Dryhurst et al., 2020) was included as an additional measure of risk perceptions. The scale had six items related to worries relating to the virus [e.g., “How likely is it that you will be directly and personally affected by (virus name) in the next 6 months?”] on a scale from 1 (“strongly disagree”) to 7 (“strongly agree”) ( $\alpha = 0.65$ ).

## Exclusions

Similar to the first study, we excluded 103 participants who failed an instructional manipulation check. However, in contrast to the first study, we did not exclude 149 individuals who (a) had the virus, (b) were in physical contact with someone who had the virus, or (c) had close family and friends who had

the virus<sup>2</sup>. This was to capture the reality of how widespread the virus had become by the time this second study was conducted (August 2020).

## Analysis Plan

The analysis plan remained unchanged from the first study and we compared means across conditions (COVID-19 vs. Coronavirus vs. Wuhan Virus vs. China Virus) using analysis of variance (ANOVA). Similar to Study 1, exploratory analyses explored the moderating effects of political affiliation.

## Results

Descriptive statistics and correlations are provided in **Table 3**. A comparison of means across each country sample is shown in **Table 4**. A summary of means across the two studies and four conditions is shown in **Table 5**.

### Sinophobia

Replicating the results of Study 1, but extended to the new China Virus condition, we found no differences across conditions on sinophobia, with strong support for the null hypothesis [ $F(3, 408) = 1.21, p = 0.30, \eta = 0.01, BF_{10} = 0.051$ ] (see also **Table 4**). Additionally, replicating the results of the first study, the interaction of political affiliation with condition was not significant, with very strong support for the null hypothesis,  $F(6, 399) = 0.56, p = 0.76, \eta = 0.01; BF_{10} = 0.002$ .

### Anxiety, Risk Aversion, and Beliefs About the Virus

Similar to Study 1, we first compared means across the four naming conditions for anxiety, risk aversion, and beliefs about contagiousness/mortality separately. Below, we report results pooled across the two samples (US and India). Note that similar patterns were seen within place-specific samples (see **Table 4**). We found no main effect of naming on anxiety, with Bayesian analyses showing “very strong” evidence for the null hypothesis,  $F(3, 408) = 0.77, p = 0.51, \eta = 0.01; BF_{10} = 0.028$ .

<sup>2</sup>We declared in our pre-registration that we would exclude infected individuals and therefore we ran the same set of analyses on the reduced sample as well. The results remained unchanged.

**TABLE 3 |** Summary statistics and correlations for Study 2. Presented below are the means, standard deviations, and correlations for all variables across the entire sample.

	M	S.D.	Min	Max	1	2	3	4	5
Anxiety	2.72	1.22	1	5	[0.94]				
Risk aversion	2.18	0.74	1	5	0.42***	[0.65]			
Contagiousness beliefs <sub>(logged)</sub>	2.16	0.98	0	4.62	0.20***	0.11*	–		
Mortality beliefs <sub>(logged)</sub>	1.84	0.98	0	4.60	0.33***	0.18***	0.38***		
Sinophobia	0	0.78	–1.68	1.78	–0.16***	–0.20***	0.03	–0.12*[0.68]	
Political affiliation	2.06	0.89	1	3	0.21***	0.12*	0.05	0.15**0.03	

Alpha coefficients for composite measures are provided in brackets. \*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .

Similarly, no significant differences emerged for the measure of the risk perceptions with strong support for the null,  $F(3, 408) = 0.59, p = 0.62, \eta = 0.00; BF_{10} = 0.022$ . Similarly, no effects were found on beliefs about contagiousness or mortality with Bayesian analyses, suggesting strong and moderate support for the respective nulls [Contagiousness:  $F(3, 408) = 0.58, p = 0.63, \eta = 0.00; BF_{10} = 0.022$ ; Mortality:  $F(3, 408) = 2.11, p = 0.10, \eta = 0.01; BF_{10} = 0.168$ ].

## DISCUSSION

Governments, policymakers, and international bodies must decide how to refer to an infectious disease. As such, significant amounts of effort and consideration go into the process of naming an infectious disease including guidelines being made and international conferences held (WHO, 2020b). Further, academic articles are written about best practices to “do no harm” (Fukuda et al., 2015; WHO, 2020a) and debates are sparked from global media to dinner tables as individuals condemn others for using “incorrect” and “inappropriate” names (Board, 2020; Gabbatt, 2020). However, how necessary are such debates? The present study found no evidence that the use of place-specific names leads to negative attitudes toward individuals from this location (i.e., sinophobia) and, further, Bayesian analyses found strong support for the null hypothesis. This is notable given that potential to cause xenophobia is one of the primary reasons given for not using place-specific names for infectious diseases (Fukuda et al., 2015; WHO, 2020a,b). Additionally, we found no evidence that naming alters anxiety, risk perceptions, or beliefs about the virus. These two empirical results, replicated across two studies at different time points, shed light on the limited impact of infectious disease naming in times of a pandemic and are further discussed below.

The null effect of using a place-specific name (“Wuhan Virus” or “China Virus”) on xenophobia is striking and contrary to the prevalent assumption in public policy discourse and the media (Board, 2020; Gabbatt, 2020; WHO, 2020a,b). In addition, the replication of this effect across two time points and different political affiliations lends robustness to the findings. This result does not imply that a negative association of China with the pandemic does not lead to sinophobia. Instead, it is evidence that the use of place-specific names is not sufficient to generate this negative association. To understand this better, we consider more closely how infectious disease names arise and situate the finding within the literature on racist language use.

The initial name for an infectious disease is typically one that is associated with its location of origin. A similar trend is seen across several infectious diseases, e.g., Spanish Flu, Middle-East Respiratory Syndrome, Zika, or Ebola. This is likely due to the origin being salient in the early outbreak, making it an easy name to generate for the public discourse (WHO, 2020a). There is also a broader tradition of naming phenomena by the place or person of origin that pervades much of our language, for example, names (e.g., O’Reilly, Tang, and Romanov), food (e.g., Kobe beef and English mustard), and species (e.g., Florida panther). For this article, the pertinent question is whether the act of naming



**TABLE 4 |** Effect of naming on individual perceptions and beliefs for Study 2. Presented below are the results of one-way ANOVAs run on each of the study variables across the two samples and the entire sample.

Sample	Statistics	Anxiety	Risk aversion	Contagiousness beliefs <sub>(logged)</sub>	Mortality beliefs <sub>(logged)</sub>	Sinophobia	No. of observations (N)
US	df	3	3	3	3	3	240
	F	0.51	0.52	0.14	0.54	0.52	(58, 60, 60, 62)
	Prob > F	0.68	0.67	0.93	0.66	0.67	
	$\eta$	0.01	0.01	0.00	0.01	0.01	
India	df	3	3	3	3	3	172
	F	1.11	0.23	1.48	5.52	0.76	(39, 42, 44, 47)
	Prob > F	0.34	0.88	0.22	>0.01	0.52	
	$\eta$	0.02	0.00	0.02	0.09	0.01	
Entire Sample	df	3	3	3	3	3	412
	F	0.77	0.59	0.58	2.11	1.22	(97, 102, 104, 109)
	Prob > F	0.51	0.62	0.63	0.10	0.30	
	$\eta$	0.00	0.00	0.00	0.01	0.01	

Brackets under N show no. of observations per manipulation condition (COVID, Coronavirus, Wuhan Virus, China Virus).

**TABLE 5 |** Summary of outcome variables in the four conditions.

Outcomes	Study	Min	Max	Means (SD)			
				COVID-19	Coronavirus	Wuhan Virus	China Virus
Anxiety	Study 1	1.00	5.00	3.00 (1.09)	2.97 (1.12)	2.99 (1.12)	
	Study 2	1.00	5.00	2.85 (1.28)	2.67 (1.14)	2.61 (1.16)	2.77 (1.27)
Risk aversion	Study 1 <sup>1</sup>	1.50	7.00	5.60 (0.83)	5.47 (0.92)	5.42 (1.01)	
	Study 2	1.00	5.00	3.42 (0.76)	3.51 (0.75)	3.38 (0.64)	3.44 (0.68)
Sinophobia	Study 1	-2.00	2.33	0.24 (0.94)	0.16 (0.96)	0.11 (1.01)	
	Study 2	-1.68	1.78	-0.05 (0.80)	-0.07 (0.80)	0.00 (0.75)	0.11 (0.76)
Contagiousness <sub>(logged)</sub>	Study 1	0.00	4.61	2.61 (1.14)	2.33 (1.06)	2.44 (1.16)	
	Study 2	0.00	4.61	2.08 (0.92)	2.20 (0.95)	2.11 (0.97)	2.23 (1.07)
Mortality <sub>(logged)</sub>	Study 1	0.00	4.61	2.04 (1.03)	2.01 (1.01)	2.02 (1.06)	
	Study 2	0.00	4.59	1.78 (0.83)	1.81 (0.92)	1.71 (0.93)	2.03 (1.18)

<sup>1</sup>(DOSPERT).

an infectious disease by its location (e.g., Wuhan) is enough to create a negative association with people from that location (e.g., Chinese individuals). The results of this paper provide empirical evidence that this may not be the case. Specifically, Bayesian analyses lend strong support to the null hypothesis that using a place-specific name (e.g., Wuhan Virus or China Virus) does *not* lead to increased sinophobia.

These findings speak to a broader literature on the use of racist language in public discourse. Increasing scholarly attention has been given to the impact of racist language since the rise of social media (e.g., Twitter), which gives racist individuals a platform to share and spread their views online (Chaudhry, 2015; Matamoros-Fernández, 2017). The defining element of racism is the act of discrimination against certain individuals or groups (Dovidio, 1986). Past research has documented the negative effect of discriminatory language both on the individuals being discriminated against and the broader society exposed to these terms (Gerstenfeld et al., 2003; Faulkner and Bliuc, 2016). Based on this, the current article suggests that with respect to the naming of infectious diseases, the sole use of place-specific names is not sufficient to incite racist attitudes among the public. Nevertheless, these findings do not speak to a

situation in which these terms are used to intentionally associate blame or discriminate against individuals from these locations. Moreover, this research does not consider the important element of how individuals from these locations (e.g., China) feel about the use of the terms and the potential negative psychological impact it might have on these individuals (Mays et al., 2007). Such research would be particularly important so that empirical research can inform social media sites on whether place-specific names should be considered harmful language and thus appropriately moderated (Chaudhry, 2015). In sum, while this research provides the first empirical evidence that infectious disease naming does not impact xenophobia, there are many important avenues for future research to explore.

A second empirical finding from this research is the lack of evidence for an effect of naming on anxiety, risk perceptions, or beliefs about the virus. Further, Bayesian analysis showed mild to strong evidence for the null hypothesis across all outcomes. This finding is one of the few cases showing a null effect of naming on psychological outcomes (cf. Malter, 2014). Instead, reviewing the psychology of naming literature, one would generally find evidence supporting an effect of naming (e.g., Wood, 1991; Jung et al., 2014; Waytz et al., 2014). This is potentially due

to a publication bias in psychology favoring significant results over null results (Ferguson and Brannick, 2012; Laws, 2013). A negative consequence of this bias is that it may lead to the false impression that the impact of naming is “always” significant and thus likely pervasive across many different domains. This in turn might have contributed to the strong media and policy discourse around the naming of infectious diseases (Board, 2020; Gabbatt, 2020; WHO, 2020a). Therefore, given the lay hypothesis that naming significantly impacts individual’s perceptions and responses to an infectious disease, the significant evidence in favor of the null hypothesis provided by this paper can be seen as an important contribution to research on the psychology of naming.

This research should be viewed in light of its strengths and limitations, which also point to future research directions. As a strength, the pre-registration of the study materials and analysis plan reduced researcher degrees of freedom, strengthening the paper’s conclusions relating to the main effects of naming (Nosek and Lakens, 2014). Also, the use of Bayesian testing of the null hypothesis helps in providing novel insights into what policymakers and researchers can *decrease* their focus on, as opposed to the general recommendations of what they should *increase* their focus on (Etz and Vandekerckhove, 2018).

Moreover, one important issue in research on the psychology of naming is tracking the impact of long-term exposure to the different names of an infectious disease. It is plausible that repeated exposure to place-specific names, such as “Wuhan Virus” might increase the chance that the negative associations with the pandemic are translated into negative attitudes toward individuals from Wuhan or China more broadly, especially in the light of significant economic impacts of the pandemic on individuals. This paper sought to partially address this issue by replicating the results in a second study conducted nearly 5 months after the initial study. This replication at least demonstrates that the effects are robust to increased exposure to all the names. Nevertheless, future research can explore more specifically the effects of increased exposure to a specific name.

A limitation of this research is its narrowed focus. Given that, to our knowledge, this is the first empirical study investigating the effects of naming during a pandemic, many different topics could have been chosen. We chose to focus on one topic that has gained a lot of media and policy attention, i.e., the potential for harm when naming an infectious disease (Fukuda et al., 2015; Board, 2020; Gabbatt, 2020; WHO, 2020a). However, there are still numerous topics to cover within this domain. Particular areas of interest based on this paper’s findings would be investigating if place-specific names have a negative psychological impact on individuals from those regions (e.g., China). It is plausible that the use of the name Wuhan or China Virus makes

Chinese individuals feel villainized or impacts *their* beliefs about the pandemic. Additionally, future research could investigate whether the tone/intention with which the name is used has an impact on the “harm” it causes. In this paper, we focused on a more prosaic use of the names, but it is possible that the name “China Virus” takes on another meaning when it is used by an individual seeking to incite sinophobia.

To conclude, this paper provided the first empirical test of the psychological effects of infectious disease naming. The key takeaway is that naming did not impact levels of sinophobia or anxiety, risk perceptions, and beliefs about the pandemic. Therefore, returning to the goal of “First Doing No Harm” (Fukuda et al., 2015), governments, media outlets, and international bodies can be more assured that their choice of name for an infectious disease is unlikely to lead to harmful xenophobia or negative psychological impacts, and thus they might be best served to focus their limited resources elsewhere.

## DATA AVAILABILITY STATEMENT

The datasets generated for this study can be found in the online repositories. The names of the repository/repositories and accession number(s) can be found below: [osf.io/9s4jk](https://osf.io/9s4jk).

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Singapore Management University Ethics Committee. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

All authors contributed to the methodological design, data analysis, and writing of the manuscript.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## APPENDIX

Below is the *ad hoc* measure developed to assess domain specific risk perceptions (Blais and Weber, 2006). For each of the following statements, please indicate the risk you perceive the described activity or behavior to be given the current outbreak of (COVID-19/Coronavirus/Wuhan Virus).

The scale ranged from 1 “Not at all risky” to 7 “Extremely risky.”

Items:

1. Going to a supermarket to buy food
2. Commuting to work on a busy train
3. Traveling on a commercial airplane
4. Going to a bar where there have been no recorded cases of (COVID-19/Coronavirus/Wuhan Virus)
5. Going to the gym
6. Going for a walk in the park
7. Ordering lunch using food delivery
8. Walking past someone who has (COVID-19/Coronavirus/Wuhan Virus)
9. Sitting next to someone on the bus for 5 min who has (COVID-19/Coronavirus/Wuhan Virus)
10. Spending 30 min of close contact (e.g., conversation) with someone who has (COVID-19/Coronavirus/Wuhan Virus)





# The Effect of Parent Psychological Distress on Child Hyperactivity/Inattention During the COVID-19 Lockdown: Testing the Mediation of Parent Verbal Hostility and Child Emotional Symptoms

## OPEN ACCESS

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The coronavirus disease 2019 (COVID-19) health crisis is strongly affecting the psychological well-being of the general population. According to a very recent literature, the imposed lockdown and social distancing measures have generated a series of negative outcomes, including fear of the future, anxiety, and somatization symptoms. Few studies have investigated the impact of the COVID-19 pandemic on the well-being of parents and children, and still fewer studies have assessed the relationship between the psychological health of parents and children. The present study aimed at understanding the effect of parents' psychological distress and verbal aggression on behavioral and emotional symptoms of children during the COVID-19 lockdown. Using an online survey administered in the first weeks of the lockdown in Italy, we explored the mediating effects of parent verbal hostility and child emotional symptoms on the relationship between parent distress and child hyperactivity/inattention in a sample of 878 Italian parents (87.4% mothers; mean<sub>age</sub> = 40.58). Two hypotheses were proposed: (1) parent distress would significantly predict child hyperactivity/inattention, and (2) parent verbal hostility and child emotional symptoms would mediate the association between parent distress and child hyperactivity/inattention. The serial mediated model confirmed both hypotheses, suggesting that higher rates of psychological distress in parents were associated with higher levels of hyperactivity/inattention in children. Parent verbal hostility and child emotional problems were also found to positively mediate this relation. Our results may be used to improve sociopsychological interventions in the general population in the near future. They may also contribute to the clinical definition of therapeutic paths for parents and families.

**Keywords:** parent psychological distress, verbal hostility, emotional symptoms, hyperactivity and attention, COVID- 19

## INTRODUCTION

The coronavirus disease 2019 (COVID-19) health crisis is strongly affecting the psychological well-being of the general population. To prevent the spread of the virus, governments worldwide have imposed social distancing measures, closed schools, and enforced mandatory lockdowns, forcing individuals to deal with new and challenging situations (Brodeur et al., 2020). In Italy, a series of restrictions of increasing severity began on February 23, 2020, with a regional lockdown initiated in Lombardy (northern Italy), where the country's first case of COVID-19 was registered (Lizzerini and Putoto, 2020). Gradually, the measures became more stringent, culminating in a national lockdown on March 11, involving the closure of schools and prohibitions on general activities.

While many studies have assessed the impact of the pandemic on the general population (Mazza et al., 2020), few studies have assessed the effects of the lockdown on the parent-child relationship or parent and child well-being (Brown et al., 2020; Gassman-Pines et al., 2020; Griffith, 2020; Marchetti et al., 2020; Patrick et al., 2020). In addition to generating negative effects in the general population, the COVID-19 lockdown may also be creating a particularly stressful environment for parents, who may face concerns over their family's health, their children's isolation from teachers and peers, and their management of homeschooling and daily commitments (e.g., working remotely and meeting financial obligations; Fontanesi et al., 2020; Romero et al., 2020). Furthermore, although very few children have been infected with COVID-19 in Italy, children are not immune to the tragic impact of the pandemic, but may experience fear, isolation, uncertainty, worry, irritability, and inattention (Jiao et al., 2020).

Several studies have documented the damaging effects of psychological stress in children following negative events; such effects include drastic changes in emotional and behavioral patterns and sleep and eating habits, higher levels of anxiety and depression, and impaired social interactions (Hoven et al., 2005; Klein et al., 2009; Lai et al., 2015; Verrocchio et al., 2018). As suggested by the literature, these symptoms may be partly determined by the direct effect of experiencing a negative event; however, parents' mental health and parenting style behaviors may also play a key role in influencing children's adjustment during stressful situations (Pfefferbaum et al., 2015, 2016).

Parents' general mental health and psychological distress are well-established risk factors for psychological problems in children (Siegenthaler et al., 2012; Verrocchio et al., 2013; Patrick et al., 2020). The literature shows that maternal mental health is associated with poor behavioral, emotional, social, and cognitive outcomes in children (Glasheen et al., 2010; Verrocchio, 2016), whereas paternal depressive symptomatology contributes to negative emotional and behavioral outcomes in children (Weitzman et al., 2011). Overall, psychological distress has been found to be associated with adverse behavioral and emotional outcomes in children (Verrocchio et al., 2019); in particular – and regardless of parent gender – parents' mental health has been found to relate to emotional symptoms in

younger children and hyperactive behavior in children of all ages (Amrock and Weitzman, 2014).

Parenting style can be described as a constellation of practices toward children that create an emotional environment and influence child development and well-being. The role of parenting style behaviors on children's emotional and behavioral problems is widely cited in the literature (Rinaldi and Howe, 2012; Braza et al., 2015). In particular, maternal verbal hostility has been shown to be responsible for children's negative emotional arousal and internalizing symptoms (Smarius et al., 2019; Pozzi et al., 2020), and parental verbal aggression (i.e., yelling and bursts of rage) has been found to be associated with depression and anxiety symptoms in children and preadolescents (Möller et al., 2016). Furthermore, although parenting style tends to be relatively stable, some parenting style behaviors can be heightened or triggered by parents' compromised psychological well-being (Tavassolie et al., 2016), especially during stressful situations (Miki et al., 2019) such as the COVID-19 lockdown.

Aggressive maternal and paternal parenting behaviors have been shown to result in emotional problems in children, and these emotional problems may trigger the onset of inattention and hyperactive/impulsive symptoms (Eisenberg et al., 2001). Symptoms of emotional distress in children (e.g., irritability, sadness, and worry) are frequently accompanied by externalizing behaviors (e.g., restlessness, temper tantrums, and inability to concentrate) and may even predict attention-deficit/hyperactivity disorder (ADHD) symptoms over time (Brocki et al., 2019). In fact, recent studies have suggested that emotional problems may positively predict inattention symptoms and that high levels of physical (e.g., headaches and stomachaches) and internalizing symptoms – associated with emotional distress – are typically present before a diagnosis of ADHD (Han et al., 2020). Both internalizing and externalizing symptoms in children and preadolescents can have serious consequences for their interpersonal, cognitive, and psychological domains, such as impaired social competency, substance abuse, poor academic performance, and decreased mental health (Creavey et al., 2018; Gargano et al., 2018).

In light of these findings, it is reasonable to suggest that the present critical and unexpected situation of emergency may increase parents' mental distress; this may be reflected in a verbally aggressive parenting style, which may negatively influence children's psychological well-being. Understanding this relation and the outcomes is essential for properly addressing the needs of parents and children in the near future and for developing new interventions to help people cope with traumatic events. Italy was not only one of the first – and most severely affected – countries to suffer from the COVID-19 pandemic, but it is also subject to frequent natural disasters, earthquakes, and floods, resulting in displaced families who are forced to live in shelters and to reorganize their lives accordingly, with dramatic consequences for children's general well-being.

Although a wide range of maladaptive parenting practices may contribute to an undesirable parent-child relationship, the current study focused on the role of a single component of aggressive behavior in parents. Specifically, the present research aimed at understanding the relationship between

parent psychological distress, parent verbal hostility, and child behavioral and emotional symptoms during the COVID-19 lockdown. Although there is evidence of a bidirectional relation between parents and children, with children's characteristics eliciting certain parenting practices (e.g., Zadeh et al., 2010; Pearl et al., 2014), some studies have demonstrated that parental practices affect children's behavior much more strongly than the reverse (Choe et al., 2013). On this basis, we explored the mediating effects of parent verbal hostility and child emotional symptoms on the relationship between parent psychological distress and child hyperactivity/inattention in a sample of Italian parents. Drawing on the process-oriented model of developmental trajectories and child adjustment (Cummings et al., 2000; Miragoli and Verrocchio, 2008), which suggests that different factors and environments may encourage development along an adaptive or potentially maladaptive trajectory, we proposed two hypotheses: (1) parent psychological distress would significantly predict child hyperactivity/inattention behavior and (2) parent verbal hostility and child emotional symptoms would mediate the association between parent psychological distress and child hyperactivity/inattention behavior.

## MATERIALS AND METHODS

### Participants and Procedure

The study sample was part of a wider research project investigating the effect of the COVID-19 pandemic on the mental health of Italian parents and children. From April 3 to 14, participants completed an anonymous online survey on the Qualtrics platform, after reading and approving a consent form describing the aims of the study, participant rights, and the data treatment procedure. The survey took approximately 20 min to complete. Participants were randomly recruited through social media and snowball sampling and selected according to the following inclusion criteria: (a) being at least 18 years old and (b) being a parent to at least one child aged 3–13 years, with whom they were spending the lockdown. With respect to the latter criterion, we selected this age range for the children because we expected that the parents of these children would be experiencing a higher education-related burden during the lockdown, as younger children often require more parental assistance in their lessons and homework than do adolescents. The research protocol was approved in accordance with the Declaration of Helsinki and its revisions (General Assembly of the World Medical Association, 2014) by the local ethics committee (Board of the Department of Human Neuroscience, Faculty of Medicine and Dentistry, Sapienza University of Rome, n. 6.2020).

### Measures

The survey consisted of, first, a set of sociodemographic questions investigating parents' age, gender, marital status, work status, and level of education and the age and gender of the target child. Following this, the survey presented a series of standardized measures of parent psychological distress and verbal hostility

and child emotional symptoms and hyperactivity-inattention behavior during the COVID-19 lockdown.

Psychological distress of parents was assessed with the General Health Questionnaire-12 (Piccinelli et al., 1993; Piccinelli and Politi, 1993; Giorgi et al., 2014). This is a 12-item measure of somatic symptoms, depression, anxiety, insomnia, and social dysfunction. Participants were asked to evaluate how their distress had changed since the beginning of the lockdown on a scale from 0 to 3, with higher scores indicating a worse mental health condition (example item: "Have you felt constantly under strain?"). In the present sample, internal consistency was good ( $\alpha = 0.85$ ).

Verbal hostility of parents was assessed using three items (yells or shouts when child misbehaves, argues with child, and explodes in anger toward child) of the Italian short version of the Parenting Styles and Dimensions Questionnaire (Robinson et al., 1995, 2001; Confalonieri et al., 2009). Each item was rated on a five-point Likert scale ranging from 1 (*never*) to 5 (*always*). Participants were asked to evaluate the number of times they had used verbal hostility toward their child since the beginning of the lockdown. Total scores were created by summing the three-item scores. In this study, the Verbal Hostility subscale had acceptable internal consistency ( $\alpha = 0.76$ ).

Emotional symptoms and hyperactivity/inattention of children were assessed by parents using the Italian version of the Strengths and Difficulties Questionnaire-Parent Report (SDQ; Goodman, 2001; Marzocchi et al., 2002). The SDQ is a widely used brief behavioral screening instrument that assesses children's positive and negative attributes across five scales, each composed of five items: Emotional Symptoms, Conduct Problems, Hyperactivity/Inattention, Peer Problems, and Prosocial Behavior. For the present study, the Emotional Symptoms and Hyperactivity/Inattention subscales were used to assess emotion and behavioral problems. Participants were asked to evaluate – on a three-point Likert scale ranging from 0 (*not true*) to 2 (*certainly true*) – the presence of emotional and behavioral problems in their child during the lockdown. Example items of the two subscales used in this study include "Restless, overactive, and cannot stay still for long" and "Often unhappy, downhearted, or tearful." In the current study, the Emotional Symptoms and Hyperactivity/Inattention subscales had acceptable internal consistency ( $\alpha = 0.76$  and  $\alpha = 0.71$ , respectively).

### Data Analysis

Prior to the main analysis, we examined the data using frequencies and descriptive statistics. Data were screened for deviation from parametric assumptions and met the requirements without transformation. To test our hypotheses, we used Pearson correlations to investigate associations between parent psychological distress, parent verbal hostility, child emotional symptoms, and child hyperactivity-inattention experienced during the COVID-19 lockdown. Following this, we evaluated the association between child gender, age, and hyperactivity/inattention behavior in order to determine whether to include covariates in the hypothesis-testing model. Finally, we employed PROCESS Model 6 in SPSS 26.0 to examine Hypotheses 1 and 2. In addition, a 95% bias-corrected confidence interval

with 5,000 bootstrap samples was applied to determine the significance of the mediational effect.

## RESULTS

### Descriptive Statistics and Correlations

A total of 878 caregivers (87.4% mothers; mean<sub>age</sub> = 40.58 ± 6.41) who responded to the survey met the inclusion criteria and were included in the study. Descriptive data on the sample are summarized in **Table 1**. Means and standard deviations of all variables and the correlations between variables are displayed in **Table 2**. The results demonstrated significant and positive correlations between parent psychological distress during the COVID-19 lockdown, parent verbal hostility, child emotional symptoms, and child hyperactivity-inattention behavior, providing preliminary support for our hypotheses. Child gender and age were significantly related to hyperactivity/inattention behavior. Specifically, being male and younger was associated with higher hyperactivity/inattention behavior.

### Serial Mediation Model

There was a statistically significant direct effect confirming Hypothesis 1, that parent psychological distress during the COVID-19 lockdown would predict child hyperactivity-inattention behavior. Furthermore, indirect effects were also statistically significant, providing support for Hypothesis 2

(**Table 3; Figure 1**), that parent verbal hostility and child emotional problems during the lockdown would be positive serial mediators of the relationship between parent psychological distress and child hyperactivity-inattention.

## DISCUSSION

The present study examined the links between parent psychological distress, parent verbal hostility, and child emotional symptoms and hyperactivity-inattention during the COVID-19 lockdown, with an emphasis on the identification of potential mediating processes among these variables.

Throughout the pandemic, the psychological condition of parents and children has been an area of professional and institutional concern, worldwide. Nonetheless, despite the significant clinical interest in this topic, little effort has been devoted to its study. The present research thus extends our empirical knowledge of the relationship between parents' mental health and children's psychological well-being during a pandemic.

A primary goal was to explore the associations between parents' psychological distress and children's hyperactivity/inattention during the COVID-19 lockdown. The results showed that parents' psychological distress significantly predicted children's hyperactivity/inattention. This result was consistent with previous studies confirming that parents' psychological distress is a risk factor for the development of externalizing problems in children (e.g., Glasheen et al., 2010; Siegenthaler et al., 2012; Amrock and Weitzman, 2014). Furthermore, as expected on the basis of previous studies in the general population (e.g., Mayes et al., 2020), children's gender and age were significantly related to hyperactivity/inattention. Specifically, male gender and younger age were associated with higher hyperactivity/inattention. It is likely that the COVID-19 lockdown may be particularly stressful for parents, who may be facing concerns about the economic and physical health of their family; their children's isolation from peers and teachers; and the management, duration, and outcomes of their homeschooling (Fontanesi et al., 2020; Schmidt et al., 2020). These feelings and concerns may cause psychological distress, which is an emotional state characterized by depressive and anxious symptoms. Parents experiencing high psychological distress may be less attentive to and warm with their children. They may also transfer the burden of their emotional distress to their children, which could affect their children's adjustment. These results are in line with recent research suggesting that parental distress, a disadvantaged economic situation following the COVID-19 lockdown (i.e., loss of job or income), and social isolation represent important risk factors for child abuse and neglect, family violence, and a deterioration of the parent-child relationship (Brown et al., 2020; Gassman-Pines et al., 2020; Patrick et al., 2020).

The second aim of our study was to test parent verbal hostility and child emotional symptoms as mediators of the association between parent psychological distress and child hyperactivity/inattention. While the association between parent and child mental health in community samples is well-established

**TABLE 1** | Descriptive characteristics of the sample ( $n = 878$ ).

	Total sample
<b>Parental role, n (%)</b>	
Mother	767 (87.4)
Father	111 (12.6)
<b>Age</b>	
Mean (SD)	40.58 (6.41)
Range	23–67
<b>Marital status, n (%)</b>	
Single	32 (3.6)
Married	643 (73.2)
Living with a partner	127 (14.5)
Separated/divorced	72 (8.2)
Widowed	4 (0.5)
<b>Work status, n (%)</b>	
Employed	738 (84.1)
Unemployed	140 (15.9)
<b>Educational level, n (%)</b>	
Less than high school	55 (6.2)
High school	343 (39.1)
More than high school	480 (54.6)
<b>Geographic area, n (%)</b>	
North	222 (25.3)
Center	277 (31.5)
South	379 (43.2)
<b>Child gender, n (%)</b>	
Male	451 (51.7)
Female	427 (48.3)
<b>Child age</b>	
Mean (SD)	7.54 (3.16)
Range	3–13



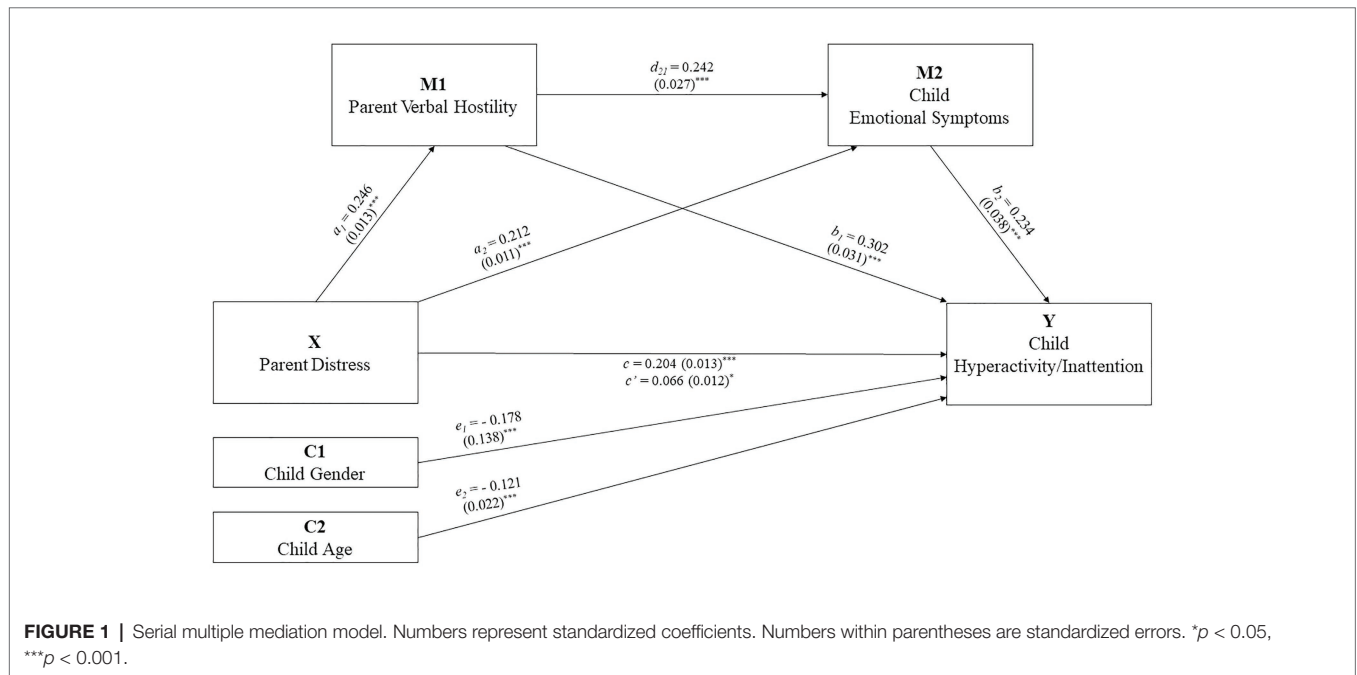
**TABLE 2** | Means, standard deviations, and correlations between study variables.

Variable	Mean	SD	1	2	3	4	5
Child gender <sup>a</sup>	–	–	–				
Child age	7.54	3.16	0.01	–			
Child hyperactivity/inattention	3.20	2.34	–0.14**	–0.15**	–		
Parent psychological distress	19.37	5.93	0.03	–0.04	0.20**	–	
Parent verbal hostility	7.74	2.38	–0.07*	0.04	0.39**	0.24**	–
Child emotional symptoms	2.03	1.95	0.01	0.06	0.33**	0.27**	0.30**

<sup>a</sup>Point-biserial coefficient. \* $p < 0.05$ ; \*\* $p < 0.01$ .

**TABLE 3** | Model coefficients for the serial mediation analysis.

	Nonstandardized coefficients (SE/ boot SE)	Bootstrapping BC 95% CI		Standardized coefficients (SE/ boot SE)	Std bootstrapping BC 95% CI		$p$
		Lower	Upper		Lower	Upper	
$R^2 = 0.2512, F(5.867) = 58.167, p < 0.001$							
Total effect	0.081 (0.013)	0.056	0.106				<0.001
Direct effect	0.026 (0.012)	0.002	0.050				0.033
<b>Indirect effects</b>							
Total indirect effect	0.055 (0.008)	0.041	0.070	0.138 (0.019)	0.103	0.175	
$a_1b_1$	0.029 (0.005)	0.019	0.040	0.074 (0.013)	0.049	0.101	
$a_2b_2$	0.020 (0.005)	0.012	0.029	0.050 (0.011)	0.030	0.073	
$a_1d_2b_2$	0.006 (0.001)	0.003	0.009	0.014 (0.003)	0.008	0.021	



(e.g., Smith, 2004; Goodman et al., 2011), many authors have argued the need to study the mechanisms through which the psychological symptoms of parents and their children are associated (Powdthavee and Vignoles, 2008; Baiocco et al., 2019). Various processes – not yet fully understood – may be used to explain the association between parent psychological distress and child behavioral problems. Parenting practices have

long been cited as an important risk factor for child externalizing problems (Prevatt, 2003; Marmorstein and Iacono, 2004). Specifically, retrospective studies have demonstrated that verbal abuse during childhood is related to externalizing and internalizing disorders in adulthood, such as mood and anxiety disorders, eating disorders, substance abuse disorders, personality disorders, and schizophrenia, as well as to suicide risk

(Carr et al., 2013; Falgares et al., 2018). In a study of children aged 9–12 years, Donovan and Brassard (2011) showed that maternal verbal aggression was associated with depressive symptoms, delinquency, peer overt and relational victimization, and low self-esteem.

The results of the present study show that parent verbal hostility and child emotional problems during the COVID-19 lockdown were positive serial mediators of the relationship between parent psychological distress and child hyperactivity/inattention. The association between parent verbal hostility and child externalizing symptoms is consistent with the findings of previous studies (Pinquart, 2017); however, the present study also considered the interrelation between child emotional symptoms and hyperactivity/inattention, due to a substantial lack of evidence on this topic. Understanding the co-occurrence and temporal dynamics of hyperactivity/inattention and emotional symptoms may be significant for explaining the development of hyperactivity/inattention from childhood through adolescence and into adulthood. In addition, a closer exploration of these processes is warranted because the additional presence of emotional symptoms can significantly affect quality of life, academic performance, adult adjustment, and lifetime psychiatric comorbidities (Wehmeier et al., 2010; Seymour et al., 2012; Verrocchio et al., 2015). Our findings show that emotional symptoms of children significantly predicted their hyperactivity/inattention. Previous studies have confirmed that hyperactive/impulsive symptoms may be related to negative emotionality, irritability, a low frustration tolerance, and conduct problems (Martel and Nigg, 2006; Sobanski et al., 2010; Lin and Gau, 2017). Furthermore, our results are consistent with the findings of a study in which children whose parents frequently expressed negative affect and low warmth displayed underregulated emotion and were more prone to displaying externalizing behaviors, relative to children whose parents were warm and frequently expressed positive affect (Eisenberg et al., 2001).

The findings of the current study should be interpreted in light of a balanced consideration of the limitations and strengths of the research. No data on the effects of parents' psychological distress on children during the COVID-19 epidemic were available at the time of investigation. The use of a cross-sectional online survey enabled us to recruit as wide and representative a sample of the Italian population as possible, and it was considered the best way to obtain a timely picture of the national situation. However, the strengths of our study (i.e., the contribution to the knowledge base, the large sample size, and the use of validated psychological measures) should be measured against the study's limitations, which include the cross-sectional study design, which prevented us from detecting the direction of causality; the exclusive reliance on parent-report data on children; the possibility of social desirability bias; the sample restriction to only those participants with Internet access; participants' motivation to take the online assessment; and the low number of fathers enrolled.

Further longitudinal research in different countries involved in the COVID-19 pandemic and the use of observational measures and/or other informants of child emotional symptoms

and behavior are needed. Future research efforts should continue to explore the negative influences of parents' psychological distress during the COVID-19 lockdown on the well-being of children. For example, researchers could explore possible negative outcomes associated with specific types of parenting styles. Child development studies have demonstrated that warmth/hostility and restrictiveness/permissiveness are reliably related to child behavior, with a combination of high warmth/care and a moderate level of control providing the healthiest emotional and social outcomes (Burns and Dunlop, 1998). Research could also explore the individual and combined influence of parent psychological distress and parenting styles in the household, as well as the influence of specific parents' occupation (e.g., nurse or doctor). Another important question is whether certain children are more or less vulnerable, depending on their personal characteristics and temperament, as well as previous psychopathological diseases that can contribute to the development of specific vulnerabilities.

The knowledge contributed by the present study about the influence of parents' psychological distress on children's well-being during a pandemic may have two notable practical implications. First, our research could have relevant implications in the social care setting and, particularly, in the implementation of population-based projects aimed at reducing parents' psychological load. Second, the results are a useful starting point for identifying the aspects that can influence the parent-child relationship and children's distress and for directing interventions in the context of family therapy.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Board of the Department of Human Neuroscience, Faculty of Medicine and Dentistry, Sapienza University of Rome (id nr. 6.2020). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MV, DM, and PR contributed to the concept and the design of the research project. LF, MV, and DM contributed to the analysis of the literature. CM and SG contributed to the administration of online survey and acquisition of data. DM and LF contributed to the analysis, interpretation and writing of data. MV, DM, LF, PR, SG, and CM participated in drafting the article and revising it critically for important intellectual content. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# The Psychological Impact of COVID-19 in Italy: Worry Leads to Protective Behavior, but at the Cost of Anxiety

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The World Health Organization defined COVID-19 as a pandemic on March 11, due to the spread of the new SARS-CoV-2 coronavirus in all continents. Italy had already witnessed a very fast spread that brought the Government to place the entire country under quarantine on March 11, reaching more than 30,700 fatalities in 2 months. We hypothesized that the pandemic and related compulsory quarantine would lead to an increase of anxiety state and protective behaviors to avoid infections. We aimed to investigate whether protective behaviors might have been enhanced or limited by anxiety and emotional reactions to previous experience of stressful conditions. We collected data from 618 Italian participants, by means of an online survey. Participants were asked to rate their level of worry for the pandemic, and to complete two questionnaires measuring the anxiety level: the state-trait anxiety inventory (STAI-Y) and the Pre-traumatic stress reaction checklist (Pre-CI). Finally, the respondents were also asked to report about their compliance with protective behaviors suggested to avoid the spread of the virus (e.g., washing hands). Results show that respondents with higher levels of worry reported higher levels of anxiety and pre-traumatic reactions, with positive correlations among the three measurements, and that higher frequency of the three protective behaviors were put in place by respondents with higher levels of worry. Moreover, regression analysis showed that worry for COVID-19 was most predicted by age, anxiety levels, and Pre-traumatic stress. These results could be interpreted in an evolutionary framework, in which the level of worry leads persons to become more cautious (protective behaviors) maximizing long-term survival at the cost of short-term dysregulation (anxiety).

**Keywords:** COVID-19, anxiety, pre-traumatic stress reactions, protective behaviors, emotional worry

## INTRODUCTION

Beginning in the last months of 2019, a new coronavirus has spread worldwide triggering a viral pandemic in a few weeks, known as COVID-19, involving a respiratory syndrome with potentially severe complications (Cascella et al., 2020). This new coronavirus had been firstly isolated in Wuhan, China (Li et al., 2020b), but in a few weeks, the virus managed to infect the whole world being defined as a pandemic by the World Health Organization on March 11, 2020. This means that

all of us were suddenly exposed to daily information about the dramatic impact of the epidemic on global health. The new term “infodemic” was coined and referred to the great amount of information available online and by means of traditional and social media which is not always truthful or controlled by reliable sources. The worldwide consequences of the pandemic have been and will continue to be highly dramatic in terms of social, financial, and individual burden such as mortality (356,000 deaths at the present time), morbidity (about two million persons infected in 5 months), deprivation of personal freedom due to the recommended or imposed quarantine, and about one trillion dollars that has been estimated to be lost<sup>1</sup> (April, 2020). The cost in terms of psychological pressure has been heavy as well. It has been recently found, for instance, that healthy persons exposed to higher doses of media information about COVID-19 also reveal higher psychological distress (Yao, 2020).

In this scenario, Italy paid a very high price with more than 30,000 deaths from the end of February to mid-April, becoming the first and most afflicted country in Europe and in the world in that period. Preliminary epidemic data showed that male individuals had a higher likelihood to contract the virus compared to females (2/3 of the Italian infected patients were males) and, once infected, males were more likely to need hospitalization and to suffer from serious consequences than females (Onder et al., 2020). Moreover, COVID-19 was found to be more dangerous for older persons than for younger ones and for patients suffering from other chronic illnesses (Remuzzi and Remuzzi, 2020). A number of online studies proliferated worldwide with the aim to understand the impact of the epidemic on psychological variables such as depression and anxiety, as for instance, in China (Huang and Zhao, 2020; Lei et al., 2020; Li et al., 2020a), Iran (Moghanibashi-Mansourieh, 2020), Turkey (Özdin and Bayrak Özdin, 2020), Spain (Ozamiz-Etxebarria et al., 2020), and Italy (Mazza et al., 2020). All of these studies confirmed the psychological cost of the pandemic, compulsory quarantine, and excessive media exposure (infodemic).

## The Current Study

The general aim of this study was to investigate whether anxiety states and previous experiences of stressful conditions (pre-traumatic stress reactions) would influence the adoption of protective behaviors in order to avoid infection and to protect individual health (for a theoretical model see Freeston et al., 2020). In particular, we first investigated the possible effects of demographic differences on the anxiety level in the general Italian population. We hypothesized (1) that personal variables (gender, age, education, and occupation), as well as living in highly infected zones, could have an impact on the anxiety levels connected to COVID-19 infection. Then, because the quarantine period was made compulsory in Italy to all of the population since the 9th of March, we aimed at providing an overview of the daily protective habits of Italians, investigating the proclivity to adopt the behaviors suggested by the WHO (washing hands, opening windows, disinfecting living environments). Thus, we also hypothesized (2) that high levels of concern and worry for

COVID-19 could have an impact on the protective behaviors (Brooks et al., 2020; Li et al., 2020c) by enhancing an abnormal illness behavior (Lipowski, 1987) toward fueling hypochondriacal concerns or avoid behavioral recommendations. In fact, recent studies limited to parents and families, suggest that anxiety levels are connected to safety behaviors, but the health risks and fear connected to COVID-19 influence the rates of stress (Lauri Korajlija and Jokic-Begic, 2020; Spinelli et al., 2020). Most of the studies concerning previous pandemics had focused on either the cognitive aspects related to what the population knew about the illness and what people really did to prevent the spread of the pandemic (Barr et al., 2008), or on the affective aspects of the disaster, investigating post-traumatic stress disorder (PTSD), depression, or anxiety (Goodwin et al., 2011; Karademas et al., 2013). Finally, we explored (3) whether anxiety states determined by the current situation and individual predisposition to anxiety reactions (pre-traumatic stress reactions) might facilitate or inhibit the suggested protective behaviors. To our knowledge, the relationship between anxiety and protective behaviors during the COVID-19 lockdown has received very little attention, with respect to other psychopathological domains. It might constitute an important helpful evidence to understand whether and up to which extent the suggested guidelines to prevent the contagion can be affected by the psychological states (namely anxiety and stress) and by demographical differences (e.g., age, gender, and regional areas). Importantly, as it would be difficult to identify people meeting DSM-5 (American Psychiatric Association, 2013) diagnostic criteria for PTSD, because the pandemic is still ongoing, participants were asked to complete a questionnaire already used with Afghanistan veterans to measure their pre-traumatic stress reactions namely the Pre-CI scale. Previous studies have indeed shown that pre-traumatic stress reactions are a valid predictor of PTSD (Berntsen and Rubin, 2015).

## MATERIALS AND METHODS

### Data Sources and Procedure

Between March 26 and April 8, we used an online link to invite Italian participants to take part in a survey on the effects of COVID-19. During these 2 weeks, COVID-19 epidemic showed a great spread in Italy. On March 26, 62,013 persons were recorded as newly infected and 8,165 died because of COVID-19; on April 8, infected people raised at 95,262 and deaths to 17,669<sup>2</sup> on a total Italian population of 60,317,000 inhabitants. The survey was created and redistributed by using Qualtrics XM<sup>3</sup>. Participants completed the survey only after indicating their consent on a form that described the study aims, participant rights, and data treatment procedure. Participants were recruited through social media and snowball sampling. The survey took approximately 20 min to complete, and participation was voluntary, anonymous, and free. Due to both the lack of previous similar data available

<sup>2</sup><http://opendatadpc.maps.arcgis.com/apps/opsdashboard/index.html#/b0c68bce2cce478eaac82fe38d4138b1>

<sup>3</sup><https://www.qualtrics.com/it/?rid=langMatch&prevsite=en&newsite=it&geo=IT&geomatch=>

<sup>1</sup><https://unctad.org/en/Pages/Home.aspx>

when the online questionnaire was built and the need to obtain responses in a specific time window, the sample size was not specifically calculated *a priori*. At the beginning of the survey, the participants were informed that they would be asked to respond to a series of questions, specifying that all data would be treated anonymously and they were asked to agree with the informed content by clicking a button, otherwise they were redirected outside of the survey. The research was conducted in accordance with the ethical principles stated in the Declaration of Helsinki (World Medical Association, 2013), and approved by the Institutional Review Board of Psychology (IRBP) – Department of Psychological, Health and Territorial Sciences, Università degli Studi “G. d’Annunzio” Chieti-Pescara (id. nr. 20009).

The survey was composed of different sections. Here, we report data about socio-demographic information, anxiety level measured by using the STAI-Y questionnaire (Spielberger et al., 1983a), pre-traumatic stress reactions measured by using the Pre-Cl questionnaire (Berntsen and Rubin, 2015), affective worry (AW) measured by means of a list of questions adapted from a previous study (Liao et al., 2014), and protective behaviors constituted by three items about the daily behaviors recommended by the WHO in order to prevent the spread of COVID-19. When unavailable, the Italian translation was made *ad hoc* and validated by a bilingual person.

## Demographic Data

The survey was fully completed by 618 participants, including 441 females (71.36%) and 177 males (28.64%). The age of the sample ranged from 19 to 80 years old (means  $\pm$  SE:  $38.55 \pm 0.61$ ; SD = 15.26) and four age groups were created: group (a) 19–25 years old ( $N = 161$ , 26.01%); group (b) 26–35 years old ( $N = 164$ , 26.5%); group (c) 36–50 years old ( $N = 163$ , 21%); and group (d) 51–80 years old ( $N = 86$ , 26.4%). Education levels showed that 282 (45.7%) participants have a high school diploma (13 years of study), 235 (38%) have achieved the bachelor’s or master’s degree, and 101 (16.34%) have achieved a post-graduate degree. As regards with the current occupation, in our sample, 169 (23.35%) participants are students, 341 (55.18%) have a regular job, and 118 (17.47%) are retired or unemployed. These three classes were also grouped under two main categories: “unoccupied” ( $N = 265$ , 43%) and “occupied” ( $N = 353$ , 57%). Sixty-seven participants (10.8%) have declared to live in the so called “Redzones,” namely the Northern Italian regions with highest rates of deaths and infections (Lombardy, Veneto, Emilia-Romagna, and Piemonte) accounting for the 71.32% of all the COVID-19 cases in our Country.

## Measurements

### Anxiety

The Italian version of the State-Trait Anxiety Inventory, STAI-Y1 (Spielberger et al., 1983b; Pedrabissi and Santinello, 1989) was used to measure the current level of anxiety. The questionnaire is composed of 20 items investigating the general feelings of respondents on a 1–4 Likert scale. Ten items are focused on negative feelings and 10 items are focused on positive feelings. Responses on the positive items were reversed, so that higher scores to the STAI correspond to a higher level of anxiety (range:

from 1 to 80). The mean score of the whole sample was 48.92 ( $\pm 0.42$ ), Cronbach’s alpha for the present research is 0.94.

### Pre-traumatic Stress Reactions

The Pre-traumatic stress reaction Check List (Pre-Cl, Berntsen and Rubin, 2015) is a 20-item questionnaire investigating the psychological reactions to dangerous events, which at the moment of administration are still active. It has been shown to significantly correlate with the measurement of PTSD, as already found with Danish soldiers employed in Afghanistan (Berntsen and Rubin, 2015), showing its potential as a possible tool to predict the stress-related reaction in the population involved in the pandemic without the need to wait for the emergence of a PTSD diagnosis. It investigates the feelings of respondents in the last month on a 0–4 Likert scale. The final score ranges from 0 to 80, with higher scores corresponding to higher pre-traumatic reactions (e.g., intrusive involuntary images of possible future stressful events and their associated avoidance and increased arousal). As proposed by the authors who elaborated the questionnaire, pre-traumatic stress reactions are defined as disturbing future-oriented cognitions and imaginations which can be part of PTSD investigated by a temporal reversal of the past-directed items used in the diagnosis of PTSD. The advantage of this measure is that it can quantify a “sub-component” of a possible PTSD, during—not after—the traumatic event. Pre-Cl was translated in Italian and the mean score of the sample was 26 ( $\pm 0.66$ ). It could be of interest to underline that the mean Pre-Cl score measured in 211 soldiers was 22.85 (Berntsen and Rubin, 2015). For the present research, Cronbach’s alpha is 0.92.

### Affective Worry

Affective worry represents the emotional response to the risk of being infected with COVID-19. The levels of apprehension and concern for contracting the new coronavirus was measured by five items adapted from a study investigating the 2009 influenza AH1N1 pandemic in Hong Kong (Liao et al., 2014), and specifically translated in Italian: a 7-point Likert scale was used for three items, measuring (i) the level of concern to have contracted the new coronavirus with respect to a “seasonal flu” in case of flu-like symptoms, (ii) the level of concern to contract the new coronavirus in the next 1 month, and (iii) the level of concern to contract the new coronavirus in the next 1 month with respect to the overall population. A 5-point Likert scale was used to measure the level of concern to have contracted in the past 1 week the new coronavirus. A 10-point Likert scale was used to investigate the current level of concern toward the new Coronavirus. In all of the items, higher scores correspond to a higher level of concern. Cronbach’s alpha for the present research is 0.75.

### Protective Behaviors

The last part of the survey was aimed at quantifying the protective behavior acted by the respondents and corresponding to the recommendation suggested by the WHO in order to avoid the spread of the virus. In particular, participants were asked whether in the past 7 days they had (i) washed their hands more often than usual, (ii) cleaned and disinfected their house

**TABLE 1** | Characteristics of the sample.

Demographic variables	Pre-CI		STAI-Y		AW	
	<i>M</i>	<i>DS</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>Gender</b>						
<i>Men</i>	19.78	14.25	44.14	9.76	18.71	5.10
<i>Women</i>	28.78	15.68	50.84	10.06	20.64	5.00
<i>t(p)</i>	−6.89 (<0.001)		−7.55 (<0.001)		−4.31 (<0.001)	
<i>d</i>	0.60		0.67		0.38	
<b>Age</b>						
<i>(a) 19–25</i>	32.23	14.84	52.08	9.62	19.83	4.61
<i>(b) 26–35</i>	26.12	15.36	48.43	10.62	19.57	5.05
<i>(c) 36–50</i>	22.65	15.84	47.14	10.17	20.50	5.15
<i>(d) Over 51</i>	23.18	15.55	47.71	10.59	20.53	5.55
<i>F(p)</i>	12.66 (<0.001)		7.27 (<0.001)		1.39 (0.345)	
<i>Tukey's HSD</i>	a>b,c,d		a>b,c,d			
<b>Education</b>						
<i>(a) High School diploma</i>	27.18	16.54	49.77	10.50	20.41	5.21
<i>(b) Bachelor/Master Degree</i>	26.86	15.09	49.21	10.10	19.87	5.07
<i>(c) Ph.D.</i>	21.95	14.78	45.89	10.45	19.68	4.88
<i>F(p)</i>	4.44 (0.012)		5.36 (0.015)		1.08 (0.340)	
<i>Tukey's HSD</i>	c<a,b		c<a,b			
<b>Occupation</b>						
<i>(a) Student</i>	31.84	14.13	51.91	9.37	19.71	4.46
<i>(b) Worker</i>	24.39	16.38	47.61	10.82	20.43	5.28
<i>(c) Unoccupied</i>	23.93	14.30	48.84	9.68	19.51	5.34
<i>F(p)</i>	13.97 (<0.001)		9.49 (<0.001)		1.93 (0.15)	
<i>Tukey's HSD</i>	a>b,c		a>b,c			
<b>Living in Redzones</b>						
<i>Yes</i>	25.84	15.48	47.38	10.75	20.13	4.48
<i>No</i>	26.22	15.84	49.01	10.40	20.09	5.14
<i>t(p)</i>	0.62 (0.53)		−0.03 (0.97)		1.24 (0.21)	
<i>d</i>	0.02		0.15		0.01	

**TABLE 2** | Means, standard deviation and differences in the study variables between protective behaviors groups.

	Pre-CI		STAI-Y		AW	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>Wash hands</b>						
<i>COVID-19 (N = 592)</i>	26.28	15.78	49.03	10.36	20.30	5.00
<i>Other (N = 26)</i>	24.50	16.71	46.35	11.48	15.19	4.97
<i>t(p)</i>	0.532 (ns)		1.28 (ns)		1.28 (<0.001)	
<i>d</i>	0.11		0.24		1.02	
<b>Disinfected/clean the house</b>						
<i>COVID-19 (N = 487)</i>	26.64	15.87	49.26	10.35	20.75	4.97
<i>Other (N = 131)</i>	24.58	15.51	47.66	10.60	17.61	4.91
<i>t(p)</i>	1.32 (ns)		1.55 (ns)		6.44 (<0.001)	
<i>d</i>	0.13		0.15		0.63	
<b>Open windows</b>						
<i>COVID-19 (N = 244)</i>	28.68	16.68	50.93	10.50	21.75	4.71
<i>Other (N = 374)</i>	24.59	15.01	47.61	10.16	19.00	5.08
<i>t(p)</i>	3.17 (<0.001)		3.90 (<0.001)		6.78 (<0.001)	
<i>d</i>	0.26		0.32		0.56	



more often than usual, and (iii) often opened home windows to maintain good ventilation. Moreover, in case of a positive response, participants were asked to state whether that behavior was carried out specifically to prevent the infection spread or for other reasons. For these three items, the responses were coded as one if the respondents declared to have carried out the behavior to prevent the Coronavirus spread, otherwise they were coded as 0.

## Statistical Analysis

Data were analyzed using IBM SPSS 26. *T*-tests and analysis of variance (ANOVA) were used to analyze the differences between subgroups in the study variables. Cohen's *d* was used as effect size index for the comparison between means and Tukey's HSD for ANOVA *post hoc* analysis. Pearson correlation analysis was used to assess the correlation between the study variables. Hierarchical linear regression model was used to evaluate the influences of personal factors and psychological variables on the affective worries. Predictors were personal factors (gender, age, and occupation), COVID-19-related experiences (living in a high infected density area), and psychological variables (Pre-Cl and STAI-Y).

## RESULTS

### Personal Variables and Anxiety

Table 1 shows the sociodemographic characteristics and scale scores of the sample. Female participants scored significantly higher than male participants to psychological scales of Pre-Cl ( $d = 0.60$ ), STAI-Y ( $d = 0.67$ ), and in the AW ( $d = 0.38$ ). ANOVA *post hoc* results showed that Pre-Cl and STAI-Y scores ( $p < 0.05$  and  $p < 0.01$ , respectively) were significantly higher in less educated participants and students ( $p < 0.01$  and  $p < 0.01$ , respectively), which was to be expected because a large number of participants with a high school diploma were college students (35%). Surprisingly, living in a highly COVID-19 infected areas (*redzones*) did not affect the psychological scales scores. Pearson correlation analysis showed that trait anxiety (STAI-Y) was largely associated with Pre-Cl ( $r = 0.708$ ,  $p < 0.01$ ) and moderately with AW ( $r = 0.434$ ,  $p < 0.01$ ) that, in turn, was moderately associated with Pre-Cl ( $r = 0.397$ ,  $p < 0.01$ ) (data not shown; available at request to the corresponding author).

### The Effects of Concern for COVID-19 on Protective Behaviors

Table 2 shows the characteristics of suggested protective behaviors. People who carry out protective behaviors due to concern about COVID-19 infection showed higher levels of AW. In particular, people who wash their hands more frequently due to the fear of being infected showed significantly higher levels of AW than other participants ( $d = 1.04$ ), a moderate effect was also found in participants who disinfected or cleaned their house due to COVID-19 ( $d = 0.63$ ). Participants who open their windows to refresh their house to prevent the infection of COVID-19 showed moderately higher levels of Pre-Cl ( $d = 0.26$ ) and trait anxiety ( $d = 0.32$ ), and higher levels of AW ( $d = 0.56$ ). Table 3

**TABLE 3 |** Hierarchical regression analysis for personal and psychological variables predicting affective worry (AW).

	B	SE	$\beta$	R	R <sup>2</sup>
<i>Step 1</i>					
Gender	0.78	0.42	0.07	0.20	0.04***
Age	0.04	0.01	0.11**		
Education	-0.41	0.26	-0.06		
<i>Step 2</i>					
Redzones	0.45	0.58	0.03	0.23	0.05*
Occupation	1.50	0.40	0.15***		
<i>Step 3</i>					
STAI-Y1	0.15	0.02	0.30***	0.49	0.24***
Pre-Cl	0.07	0.02	0.20***		

The tabled values for beta reflect Bs after Step 3, \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

Gender: 1, male; 2, female; Redzones: 1, living in a Redzone; 0, not living in a Redzone; Occupation: 1, working, 0, student/not unoccupied.

shows the hierarchical regression model for predicting AW from sociodemographic and psychological variables. Being older ( $B = 0.04$ ,  $\beta = 0.11$ ,  $p < 0.01$ ), and having an occupation during the lockdown ( $B = 1.50$ ,  $\beta = 0.15$ ,  $p < 0.001$ ) were significantly associated to AW, even though they predicted only less than 1% of its variance. Trait anxiety ( $B = 0.15$ ,  $\beta = 0.30$ ,  $p < 0.001$ ) and Pre-Cl ( $B = 0.70$ ,  $\beta = 0.20$ ,  $p < 0.001$ ) showed higher association with AW by explaining 24% of its added variance.

## DISCUSSION

A number of studies published in the last weeks (Liao et al., 2014; Asmundson and Taylor, 2020; Huang and Zhao, 2020; Lei et al., 2020; Mazza et al., 2020; Moghanibashi-Mansourieh, 2020; Ozamiz-Etxebarria et al., 2020; Özdin and Bayrak Özdin, 2020) showed increased anxiety and stress levels due to the COVID-19 pandemic and lockdown. The present study was aimed at investigating the behavioral impact of emotional responses to such a stressful event. As expected, the results of the present study confirm gender and age differences on psychological reactions to COVID-19 consistent with another recent Italian report (Mazza et al., 2020). Women and younger adults scored significantly higher to trait anxiety (STAI-Y), pre-traumatic stress levels (Pre-Cl), and AW than men and older participants. These results are in line with previous investigations showing overall higher levels of anxiety (McLean et al., 2011; Li and Graham, 2017) and vulnerability to experience post-traumatic reaction in women than in men (Sareen et al., 2013). Furthermore, younger adults are likely to be more exposed to "infodemia" because they can be more exposed to social media and the Internet (Siliquini et al., 2011) and, therefore, more vulnerable to increased anxiety and stress attributable to this massive and uncontrolled exposition to pandemic information (Yao, 2020). Another possible explanation for this latter result is that younger participants may have a lower psychological buffer because of a lower educational level since younger age, student status, and education all experienced more anxiety than the other subgroups. Surprisingly, living in

a “redzone” (i.e., in a highly infected area with higher mortality rates) did not influence emotional reactions or behavioral habits. This may be due to the fact that less than 11% of our sample lived in a “redzone” or that the local impact of the infection were less powerful than the “infodemic” influence on psychological states. Overall, within our sample, only gender is related to the AW, whereas age, educational level, occupation, and gender are related to both anxiety and stress reactions. This pattern of results is partially confirmed by the regression model showing that 24% of the total variance of AW is explained by older age, having a job during the lockdown, and stress.

Our aim was also to assess the effect of these psychological traits on the daily behavior suggested in order to prevent the spread of the virus. To this aim, we took into account three specific behaviors (frequent hands washing, house disinfection, and opening windows), and asked participants whether they complied with these behaviors in the last weeks with the specific aim to prevent the pandemic. The results showed that hand washing and house cleaning/disinfecting are not influenced by either anxiety or stress levels, while participants with higher scores in both anxiety and stress scales are more prone to open the windows to ventilate the living environments. Furthermore, all of the three protective behaviors (hand washing, house disinfecting, and opening the windows) are influenced by the AW: participants with a higher level of worry about the COVID-19 declared to carry out each behavior more than the participants with a lower level of AW. The present data suggest that the anxiety connected to the fear of COVID-19 infection can be the motivation to engage in the recommended protective behaviors.

It is also relevant to note that our sample scores are relatively higher in the STAI-1Y scale. In fact, 63% of participants reported a score higher than 40, which researches suggest to be the clinical cut-off score for moderate symptoms, and the 14% scored higher than 60, which is the cut-off score for severe clinical anxiety symptoms (Pedrabissi and Santinello, 1989; Barisone et al., 2004). It is possible to suggest that, in line with other studies (Marchetti et al., 2020; Mazza et al., 2020), the general population’s levels of anxiety and stress symptoms have risen due to COVID-19 fear and uncertainty.

A final remark has to be made concerning the measured stress. As specified, we measured the stress level by means of the Pre-Cl, a scale previously used with Afghanistan soldiers before, during, and after their war experience (Berntsen and Rubin, 2015). This scale has been shown to significantly predict the PTSD symptoms in that population, and we used this scale in order to have a rapid frame of a possible PTSD in the general population, at least in Italy, once the medical emergency will be controlled (namely, after the traumatic period). These results may be intended as a snapshot of a possible escalation of PTSD in the world, although caution is needed about the possibility to generalize this conclusion. In fact, it should be highlighted that an online survey was the only tool available to collect data during the quarantine. Nevertheless, due to the specific methodology used, one of the limitations is the uncontrolled representativeness of the sample (e.g., higher proportion of younger than older respondents, as well as of women rather than men). Similarly, some of the psychological scales used in the present study are not specifically validated for the online testing, and in particular, the Pre-Cl

is a scarcely used test, which has been employed with Danish soldiers and it was not used in circumstances similar to those here described. For the same reason, even if it has been shown that in the military sample Pre-Cl scores significantly correlate with PTSD (Berntsen and Rubin, 2015), we could hypothesize a generalization of such a correlation to the sample tested here, but further studies are needed in order to confirm this possibility. Finally, due to the impossibility to assess a previous diagnosis of anxiety and related disorder [e.g., obsessive compulsive disorder (OCD)], our results, while promising, can be subjected to two biases. Firstly, we investigated some behaviors that are salient for people with OCD, and this could have had an impact on some participants’ answers. Then, the participants with previous diagnosis of anxiety disorders may have found themselves in an uncomfortable situation while participating in the survey, and that may have raised the levels of anxiety. Due to these reasons, future research should investigate the effect of lockdown and COVID-19 related behavior specifically in clinical samples.

We can conclude that targeted interventions by governments and institutions in support of the psychological wellbeing of the general population are desirable. The present results suggest that a particular attention should be focused on the part of population who had shown to be more prone to anxiety and stress, namely women, younger people, and students, who could be exposed to a real post-traumatic stress disorder.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The study was designed and carried out in accordance with the World Medical Association Declaration of Helsinki and its subsequent revisions, and approved by the Institutional Review Board of Psychology – Department Of Psychological, Health And Territorial Sciences, University “G. d’Annunzio” of Chieti-Pescara. The participants provided their online informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

GP and LT: conceptualization. GP, LF, and LT: methodology and investigation. LF and PP: formal analyses. GP and LF: writing – original draft. PP and LT: writing – review. All authors contributed to the article and approved the submitted version.

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# A Postcard From Italy: Challenges and Psychosocial Resources of Partners Living With and Without a Chronic Disease During COVID-19 Epidemic

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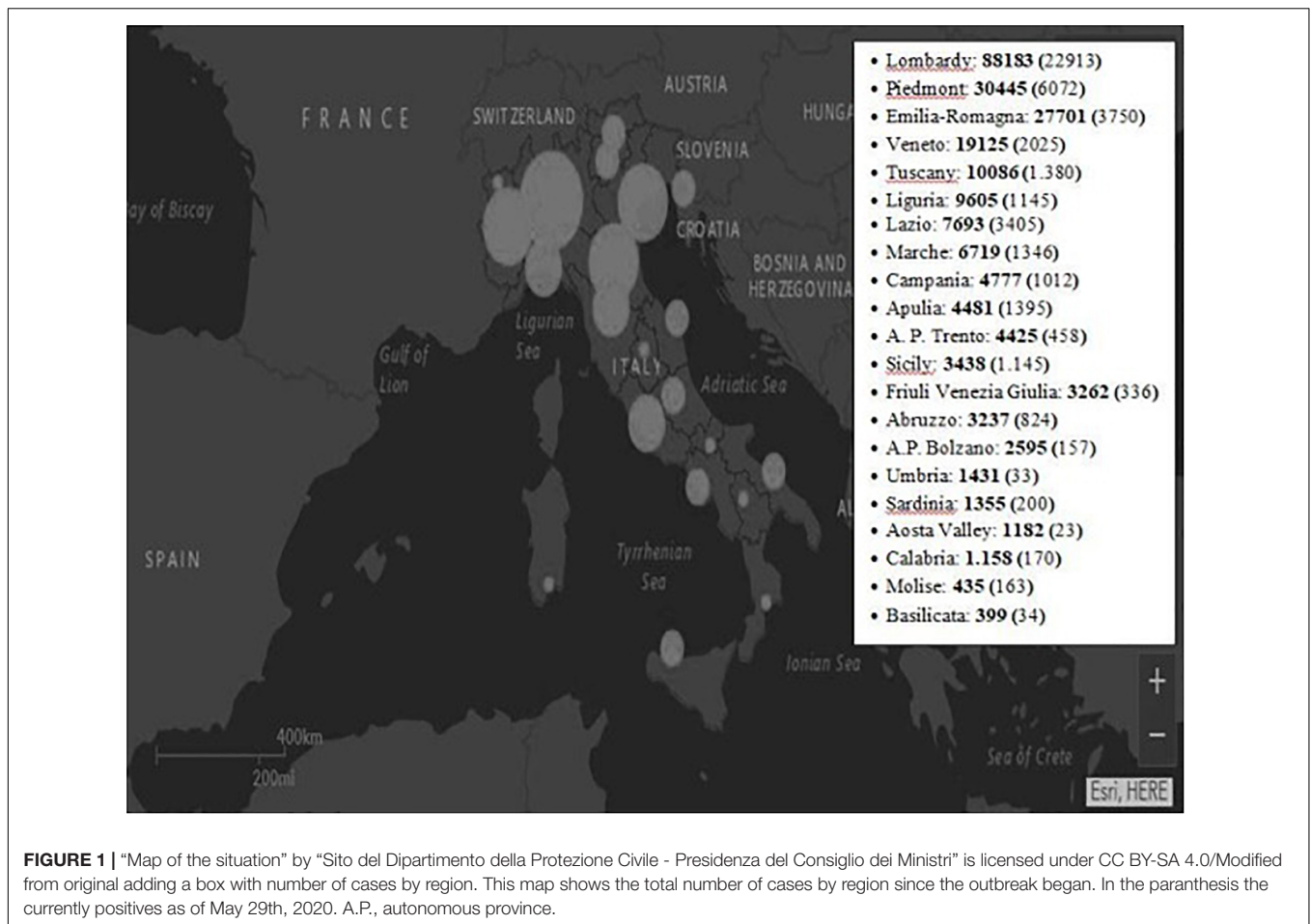
The new Coronavirus (COVID-19) has been declared a global pandemic by the World Health Organization (WHO). The sudden outbreak of this new virus and the measure of lockdown adopted to contain the epidemic have profoundly changed the lifestyles of the Italian population, with an impact on people's quality of life and on their social relationships. In particular, due to forced and prolonged cohabitation, couples may be subject to specific stressors during the epidemic. In addition, living with a chronic health condition may add specific challenges to the ones posed by the epidemic itself. The present cross-sectional study aimed to provide a picture of the challenges as well as the resources for both individual and relational well-being of Italian individuals in a couple relationship ( $N = 1921$ ), with a specific attention to the comparison between individuals living with and without a chronic disease. Results showed that people with a chronic disease had lower psychological well-being and more fears and worries about the COVID-19. People with a chronic disease perceived fewer resources than healthy people. Moreover, the challenges are shown to be associated with less psychological well-being and high pessimism about the future. Instead individual, relational, and social resources play a protective role during the pandemic for both healthy and chronically ill people.

**Keywords:** COVID-19, chronic illness, stress, psychological well-being, relational well-being

## INTRODUCTION

The new Coronavirus (COVID-19) has been declared a global pandemic by the World Health Organization (WHO). In Italy, since the first official case of COVID-19 (February 20th, 2020), a rapid spread of the contagion was reported, making Italy, and especially the North of the country, one of the countries with the highest COVID-19 infection and victim rates (**Figure 1**). Since March 11th, a strict lockdown was adopted by the Italian government to contain the epidemic: Group activities, social gatherings, outdoor activities were prohibited or strongly limited, businesses





**FIGURE 1 |** “Map of the situation” by “Sito del Dipartimento della Protezione Civile - Presidenza del Consiglio dei Ministri” is licensed under CC BY-SA 4.0/Modified from original adding a box with number of cases by region. This map shows the total number of cases by region since the outbreak began. In the parenthesis the currently positives as of May 29th, 2020. A.P., autonomous province.

that were not regarded as essential were forced to close or - whenever possible- opt for smart-working, etc. Such measures have drastically changed people’s day-to-day life. These changes were essential to contrast the spreading of coronavirus and protect the health system, though they inevitably produced some unintended consequences on people’s lives. Indeed, they profoundly affected people’s quality of life, generating not only changes in lifestyles, social relationships and in the perception of others, but also in the level of stress (Franceschini et al., 2020; Landi et al., 2020; Rossi et al., 2020). In addition to physical and psychological health risks, isolation and loneliness, closure of businesses, organization of home-schooling, economic vulnerability, and job losses were some among the many stressors derived from this emergency (e.g., Crayne, 2020; Di Crosta et al., 2020; Pietrabissa and Simpson, 2020). In fact, pandemic causes psychological consequences on those individuals who are infected by the virus (e.g., Duan and Zhu, 2020), on health professionals (e.g., Barello et al., 2020; Giusti et al., 2020; Vagni et al., 2020a), but also on the non-infected community, because they impact several aspects of social life more generally. In fact, people’s quality of life was profoundly touched by the sudden outbreak of this new virus and by this measure of lockdown (Casagrande et al., 2020; Favieri et al., 2020; Mazza et al., 2020; Zeppegno et al., 2020). Previous studies on COVID-19 reported

an influence of both the disease and quarantine measures on psychological well-being (Brooks et al., 2020; Liu S. et al., 2020; Rossi et al., 2020; Xiao et al., 2020), highlighting an increase in anxiety and depressive symptoms and in the perception of lack of control in the general population together with a general decrease in levels of well-being and perception of health in general (Lima et al., 2020).

In this scenario, having a partner, and sharing this emergency with him/her, may be an important protective factor for people’s well-being, as the couple relationship has proved to promote both physical (Koball et al., 2010; Horn et al., 2013) and psychological health (Donato and Parise, 2015; Pagani et al., 2015; Donato et al., 2018a; Pagani et al., 2020). Nonetheless, the couple itself may be subject to specific stressors during the epidemic. Forced and prolonged cohabitation, with no physical space nor time alone to unloading one’s stress and negative emotions, may have put some extra pressure on the couple’s daily life, especially if partners are already engaged in coping with additional stressors (Randall and Bodenmann, 2009).

In particular, living with a chronic health condition may add specific challenges to the ones posed by the epidemic itself (Mazza et al., 2020). Based on currently available information and clinical expertise, people of any age who have serious underlying medical conditions might be at higher risk for severe consequences from

COVID-19, thus people living with a chronic disease may have feared to be particularly susceptible to the virus or particularly at risk once infected. Several public and private agencies, in fact, resolved to provide specific guidelines for chronic disease patients in order to respond to their FAQs (e.g., the COVID-19 hotline specific for diabetes patients set up by the Italian Health Ministry). In addition, both the congestion of the health system over several weeks after the virus outbreak and the closing of outpatient services may have made chronic disease patients' management of the chronic condition as well as their daily life particularly difficult and challenging. The stress pile-up that this segment of the population may have lived with particular intensity might have lasting consequences on their well-being well after the end of the epidemic, which may reverberate on the sanitary system in the long run. On the other hand, people living with a chronic disease may have developed important competences for managing their health as well as stressful health circumstances (Bertoni et al., 2015; Graffigna et al., 2017), which may represent relevant resources to navigate the epidemic period.

The present study aimed to provide a picture of the challenges as well as the resources for both individual and relational well-being of Italian individuals in a couple relationship, with a specific attention to the comparison of individuals living with and without a chronic disease.

Stress is generally recognized as challenging for both individual and relational well-being (Donato and Parise, 2015; Pagani et al., 2015; Donato et al., 2018b; Pagani et al., 2020). In particular, according to Chinese survey data (Liu D. et al., 2020) and the United States Centers for Disease Control and Prevention (Centers for Disease Control and Prevention, 2020), the outbreak of COVID-19 has undoubtedly been a stressful event. The pandemic situation can be highly stressful for individuals at different levels. Changes in the domain of work (job uncertainty, smart-working, work overload), economic worries, and social distancing, on the one hand, and forced cohabitation, on the other hand, may be especially challenging for people's well-being (Godinic et al., 2020). In addition, fear of contagion is particularly critical for well-being (Mertens et al., 2020; Venkatesh and Edirappuli, 2020), generating anxiety for one's own personal health and for the health of significant others. Further, the pandemic situation could generate not only concerns for one's own personal and relational condition, but also concerns for the consequences of COVID-19 at a more global level (i.e., concerns for the world future, concerns for the general community). In light of this, in the present study we focused our attention on three challenges to well-being: global stress, fear of contagion, and worries about the epidemic consequences.

Besides challenges, it is important to identify also those resources that may help individuals to cope with the situation (e.g., Lenzo et al., 2020). In particular, we considered individual, relational, and social resources, which may protect individuals' well-being. At the individual level, a central concept in understanding how individuals cope with difficulties is their sense of coherence (Antonovsky, 1987). Sense of coherence can be conceptualized as a global orientation that influences the extent to which individuals perceive the world as comprehensible, manageable, and meaningful. Sense of coherence has been found

to be linked to well-being and mental health (Anderson, 1998; Eriksson and Lindström, 2007). In a situation in which the foundations of what makes life meaningful and comprehensible have been put at risk, sense of coherence may help maintain well-being. Moreover, individuals in a couple relationship can count not only on their individual coping (Vagni et al., 2020a), but also on dyadic coping strategies. Dyadic coping describes the interpersonal process partners use to jointly cope with stress (Bodenmann, 1997) and is an important factor in maintaining both individual and relational well-being (Donato, 2014; Donato et al., 2015; Pagani et al., 2019).

At the relational level, the capacity to work together as a couple against stress could be a key process in contrasting the negative impact of COVID-19 on partners' life. Also, at the social level, an important resource could be social support. Social support is an exchange of emotional, informational, or practical assistance with significant others aimed at enhancing the well-being of the recipient (Shumaker and Brownell, 1984). The psychosocial literature, in general, has highlighted the consequences for well-being of being the recipient of supportive acts. In a moment in which social distancing has been imposed as a means of prevention from contagion, perceiving the closeness and the support from one's family and friends could be protective for well-being. At this regard, we considered both individual (in terms of both psychological well-being and view of the future) and relational well-being (in terms of satisfaction for one's couple relationship).

In light of these premises, the study had two main goals: (1) To test whether healthy and chronically ill individuals differed in terms of the above challenges and resources. We could expect participants with a chronic disease to be subject to more challenges (i.e., higher levels of stress, fear of contagion, and worries about the epidemic consequences) than participants without a chronic disease. We made no specific predictions with regard to resources (i.e., individual and dyadic coping, family and friend support), as we could expect that, on the one hand, people living with a chronic disease may have developed important competences for managing their health as well as stressful health circumstances, such as a special awareness of their own health, on the other hand, however, their well-being could be more compromised than the one of their healthy counterparts due to their disease. Beyond the higher risk for severe consequences from COVID-19 for people with serious underlying medical conditions, these comparisons might allow us to reveal possible differences between people with and without a chronic health condition also in the psychosocial impact of the COVID-19 epidemic. In addition, we wanted to test whether the impact of a chronic disease on the challenges and resources experienced by individuals in couples depended on whether or not they lived in the North of Italy. The Northern regions of the country, in fact, were those more severely impacted by the epidemic. On the other hand, however, the Northern regions of Italy are also well-known to have the most efficient organization of sanitary services. (2) To analyze the moderating role of health condition (healthy vs. chronically ill) in the associations of the above challenges and resources with participants' individual and relational well-being (i.e., to test whether healthy and chronically

ill individuals differed in these associations as a function of their health condition). This analysis would allow us to identify common and/or specific factors to either contain or promote in order to protect participants' psychosocial well-being. We might expect a stronger impact of stress, fear of contagion, and worries on the well-being of participants with a chronic disease than in participants without a chronic health condition. As far as resources are concerned, in light of the reasons listed above we made no specific predictions.

## MATERIALS AND METHODS

### Participants and Procedure

The present study is part of a broader longitudinal research project, titled "The Family at the time of COVID19," developed by the Family Study and Research University Centre of the Università Cattolica del Sacro Cuore (Milan, Italy) in collaboration with the Human Highway Society. A web-based cross-sectional survey, broadcasted through different platforms and mainstream social-media, was used to collect data. The survey took place from March 30th to April 7th, the period of the national lockdown with constantly growing contagion rates. A brief presentation informed the participants about the aims of the study, and an electronic informed consent was requested from each participant before starting the investigation. The survey took approximately 30 min to be completed. A short questionnaire collected information on some demographic and COVID-19 related information. Standardized questionnaires to evaluate psychological dimensions were administered. To guarantee anonymity, no personal data, which could allow the identification of participants, were collected. Due to the aim of the current research, having at least 18 years was the only inclusion criterion adopted. The study was conducted in accordance with the Ethics Committee of the Department of Psychology of the Università Cattolica del Sacro Cuore. Participants could withdraw from the survey at any moment without providing any justification, and no data were recorded. For the purpose of the present study, we selected people reporting to be in a couple relationship ( $N = 1921$ ). The main demographic characteristics of the sample are shown in **Table 1**.

### Measures

The instrument used was a self-report questionnaire composed of the following scales, in addition to socio-demographic data.

#### Fear of Contagion

In order to assess the level of fear of being infected by the coronavirus, participants were asked to express their agreement on a 7-point Likert scale (1 = "not at all" and 7 = "very agree") to the *ad hoc* item "Are you worried about getting sick of COVID-19 (the disease caused by coronavirus infection)?"

#### Worries About the Epidemic Consequences

To assess the level of concern about the consequences of the situation connected to the spread of coronavirus, participants were asked to express their agreement on a 7-point Likert

**TABLE 1 |** Demographic characteristics of the sample.

Variables	Overall sample ( $N = 1921$ )	Healthy participants ( $N = 1446; 76.9\%$ )	Participants with a chronic disease ( $N = 434; 23.1\%$ )
<b>Gender</b>			
Female	1281 (66.7%)	952 (65.8%)	300 (69.1%)
Male	640 (33.3%)	494 (34.2%)	134 (30.9%)
<b>Age</b>			
18–24 years	12 (0.6%)	9 (0.6%)	3 (0.7%)
25–34 years	269 (14%)	224 (15.5%)	40 (9.2%)
35–44 years	656 (34.1%)	527 (36.4%)	114 (26.3%)
45–54 years	617 (32.1%)	458 (31.7%)	144 (33.2%)
55–64 years	272 (14.2%)	176 (12.2%)	92 (21.2%)
Over 65 years	95 (4.9%)	52 (3.6%)	41 (9.4%)
<b>Italian zone</b>			
Northern Italy	886 (46.6%)	660 (46.2%)	209 (48.3%)
All other zones	1017 (52.9%)	770 (53.8%)	224 (51.7%)
<b>Relationship</b>			
Marriage	1442 (75.1%)	1063 (73.5%)	349 (80.4%)
Cohabiting	479 (24.9%)	383 (26.5%)	85 (19.6%)
<b>Being a parent</b>			
Yes	1417 (73.8%)	1058 (73.2%)	327 (75.3%)
No	504 (26.2%)	388 (26.8%)	107 (24.7%)
<b>Educational qualification</b>			
Degree or Ph.D.	316 (32.7%)	540 (37.4%)	118 (27.3%)
High school diploma	525 (54.4%)	772 (53.4%)	236 (54.5%)
Secondary school diploma	118 (12.2%)	129 (8.9%)	74 (17.1%)
Primary school license	6 (0.6%)	4 (0.3%)	5 (1.2%)

scale (1 = "not at all" and 7 = "extremely") to the *ad hoc* single item "How concerned are you about the current coronavirus situation?"

### Stress

To measure their level of stress, participants were presented with a series of statements describing potential sources of stress related to different areas (personal, family or work-related). They were then asked to indicate their degree of stress related to each of these statement on a 5-point Likert scale (1 = "not at all" and 5 = "extremely"). Item examples were "Losing one's job"; "Managing family life". The Cronbach's alpha was 0.87.

### Individual Coping

Individual coping resources were assessed in terms of participants' sense of coherence, that is the confidence that one's environment is predictable and that things will work out as well as it can reasonably be expected (Antonovsky, 1979). Sense of coherence was measured through the Sense of Coherence Scale (SOC; Antonovsky, 1979; Barni and Tagliabue, 2005), which is composed of 13 items rated on a 7-point scale. Items examples are: "Are you surprised by the behavior of people whom you thought you knew well?"; "How often do you have feelings that you're not sure you can keep under control?"; "How often do you have the feeling that there's little meaning in the things you do in your daily life?". We computed a global index of the scale by

averaging the 13 items and its Cronbach's alpha was 0.79. Higher scores represent higher sense of coherence.

### Dyadic Coping

Dyadic coping is the way partners cope together against stress and was measured by the Dyadic Coping Questionnaire (DCI; Bodenmann, 1997; Donato et al., 2009). We used a selection of 8 items from the original 41-items scale, rated on a 5-point scale ranging from 1 = "never" to 5 = "very often," that measures positive and negative partner dyadic coping responses (e.g., "My partner proposed practical solutions to the problems that this situation caused"; "My partner accused me of not managing stress well enough"). In the current study, we used the total score that was computed by averaging the 8 items after reversing the negative items: Higher scores represent more supportive dyadic coping responses. The Cronbach's alpha was 0.71.

### Family Support

To assess the level of family support, we used the subscale of "The multidimensional scale of perceived social support" (Zimet et al., 1988) focused on the area of family. The four items of this subscale were rated on a 5-point Likert scale (1 = "not at all" and 5 = "very much"). Items examples are: "I can really talk to my family of my problems"; "My family really tries to help me make decision". The Cronbach's alpha was 0.93. Higher scores refer to a higher level of support from the family.

### Friends' Support

To assess the level of friends' support, we used the subscale of "The multidimensional scale of perceived social support" (Zimet et al., 1988) focused on the area of friends. The four items of this subscale rated on a 5-point Likert scale (1 = "not at all" and 5 = "very much"). Items examples are: "I can count on my friends when things go wrong"; "I have friends with whom I can share joys and sorrows". The Cronbach's alpha was 0.92. Higher scores stand for a higher level of support from friends.

### Psychological Well-Being

To measure their level of psychological well-being, participants were presented with a series of statements describing possible psychological and physical conditions. They were then asked to indicate their degree of these statement on a 6-point Likert scale (1 = "never" and 6 = "always") referring to their last week. Item examples were "I felt calm and peaceful"; "I felt discouraged and sad"; "I felt full of energy". The Cronbach's alpha was 0.65. Higher scores represent a higher level of psychological well-being.

### Pessimistic View of the Future

Pessimistic view of the future was measured through the "Dark Future Scale" (Zaleski et al., 2019) which is composed of 5 items rated on a 5-point Likert scale (1 = "absolutely wrong" and 5 = "absolutely true"). Items examples are: "I fear that the problems that worry me now will continue for a long time"; "I am terrified by the thought that I may have to face crises or difficulties in life". The Cronbach's alpha was 0.89. Higher scores refer to a more pessimistic view of the future.

### Relational Well-Being

Relational well-being was measured through one *ad hoc* item. This item ("Overall, how do you rate the relationship with your partner during this period?"), measuring global perception of couple relationship satisfaction, was administered on a 10-point scale (1 = "very negative" and 10 = "very positive"). Higher scores refer to higher relational well-being.

### Data Analyses

Data were analyzed using the software IBM SPSS version 22.0 (SPSS Inc. Chicago, IL, United States). Significance threshold was set at  $p = 0.05$ . In particular, descriptive statistics were used to summarize the overall and groups' (i.e., healthy vs. chronically ill) sample characteristics concerning the main variables of the study (Table 2). In order to explore differences among healthy people and people with a chronic disease from different regions of Italy, a series of 2 (Italian zones: Northern Italy vs. Rest of Italy)  $\times$  2 (Health status: No chronic disease vs. chronic disease) factorial ANOVAs were conducted for the study variables. Finally, a series of hierarchical multiple regression analyses was conducted to test the associations of the challenges (i.e., fear of contagion, worries about the epidemic consequences and stress) and resources (i.e., individual coping, dyadic coping, family support and friends' support) with the three outcomes of interest (i.e., psychological well-being, pessimistic view of the future, and relational well-being) as well as the moderating role of health condition in the associations between each predictor and each outcome.

## RESULTS

### Differences Among Healthy People and People With a Chronic Disease and Among Italian Zones for the Study Variables

A series of two-way factorial analysis of variance (ANOVA) was conducted for each measure. The dependent variable were: Psychological well-being, pessimistic view of the future, and relational well-being, while between-subject factors were: Health status that is the presence or absence of a chronic disease (two levels: 0 = no chronic disease; 1 = presence of a chronic disease), and Italian areas (two levels: 1 = northern Italy; 2 = rest of Italy).

#### Fear of Contagion

The ANOVA showed a significant main effect of Health status [ $F(1,1790) = 16.71, p < 0.001, \eta_p^2 = 0.09$ ]. There was also a statistically significant interaction between the effects of having or not a chronic disease and the Italian areas on fear of contagion [ $F(1,1790) = 3.77, p = 0.04, \eta_p^2 = 0.05$ ]. In particular, only in the central and southern Italy there was a significant effect of health status: People with a chronic disease who lived in central and southern Italy, had significantly more fear of contagion ( $M = 5.15, SD = 0.11, p < 0.001$ ) than healthy people who lived in the same areas ( $M = 4.57, SD = 0.06, p < 0.001$ ). In the Northern Italy there was not a significant effect of Health status (Healthy people:  $M = 4.57, SD = 0.07, p = 0.14$ ; People with a chronic disease:



**TABLE 2** | Descriptive statistics of all study variables by overall sample and groups.

Areas	Variables	Groups						
		Overall Sample ( <i>N</i> = 1921)		Healthy people ( <i>N</i> = 1446)		Chronic disease ( <i>N</i> = 434)		Scale range
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Challenges	Fear of contagion	4.67	1.70	4.57	1.69	4.96	1.71	1–7
	Worries about the epidemic consequences	6.08	1.15	6.05	1.16	6.16	1.12	1–7
	Stress	3.47	0.84	3.44	0.85	3.54	0.85	1–5
Resources (individual; dyadic; and social)	Individual coping (SOC)	4.75	1.15	4.79	1.16	4.65	1.12	1–7
	Dyadic coping	3.59	0.71	3.59	0.70	3.59	0.72	1–5
	Family support	3.36	0.97	3.39	0.96	3.23	0.97	1–5
	Friends' support	3.91	0.88	3.93	0.86	3.82	0.95	1–5
Outcomes	Psychological well-being	3.61	0.88	3.68	0.86	3.43	0.88	1–6
	Pessimistic view of the future	3.49	0.87	3.43	0.87	3.65	0.84	1–5
	Relational well-being	7.86	1.87	7.88	1.85	7.80	1.97	1–10

$M = 4.78$ ,  $SD = 0.12$ ,  $p = 0.14$ ). No significant main effect of Italian areas was found.

### Worries About the Epidemic Consequences

There was a statistically significant main effect of Italian areas [ $F(1,1859) = 7.69$ ,  $p = 0.01$ ,  $\eta_p^2 = 0.06$ ]. In particular, people who lived in northern Italy showed lower levels of worries about the epidemic consequences ( $M = 6.02$ ,  $SD = 0.05$ ) compared to people who lived in the rest of Italy ( $M = 3.19$ ,  $SD = 0.04$ ). The main effect of Health status [ $F(1,1859) = 3.44$ ,  $p = 0.06$ ], and the interaction were not significant [ $F(1,1859) = 1.11$ ,  $p = 0.29$ ].

### Stress

There was a statistically significant main effect of Italian areas [ $F(1,1859) = 9.14$ ,  $p = 0.01$ ,  $\eta_p^2 = 0.06$ ]. In particular, people who lived in northern Italy showed lower levels of stress ( $M = 3.42$ ,  $SD = 0.03$ ) compared to people who lived in the rest of Italy ( $M = 3.56$ ,  $SD = 0.03$ ). There was also a statistically significant main effect of Health status [ $F(1,1859) = 5.06$ ,  $p = 0.03$ ,  $\eta_p^2 = 0.06$ ]. In particular, people with a chronic disease showed more stress ( $M = 3.55$ ,  $SD = 0.04$ ) than healthy people ( $M = 3.44$ ,  $SD = 0.02$ ). The interaction was not significant [ $F(1,1859) = 0.10$ ,  $p = 0.75$ ].

### Individual Coping (SOC)

There was a statistically significant main effect of Health status [ $F(1,1859) = 5.27$ ,  $p = 0.03$ ,  $\eta_p^2 = 0.06$ ]. In particular, people with a chronic disease showed lower levels of individual coping, as measured in terms of sense of coherence ( $M = 4.65$ ,  $SD = 0.05$ ), than healthy people ( $M = 4.80$ ,  $SD = 0.03$ ). The main effect of Italian areas [ $F(1,1859) = 1.59$ ,  $p = 0.21$ ], and the interaction were not significant [ $F(1,1859) = 0.22$ ,  $p = 0.64$ ].

### Dyadic Coping

The main effect of Italian areas [ $F(1,1694) = 0.36$ ,  $p = 0.55$ ], Health status [ $F(1,1694) = 0.03$ ,  $p = 0.87$ ] and the interaction were not significant [ $F(1,1694) = 0.03$ ,  $p = 0.86$ ].

### Family Support

There was a statistically significant main effect of Italian areas [ $F(1,1859) = 5.08$ ,  $p = 0.02$ ,  $\eta_p^2 = 0.06$ ]. In particular, people who lived in northern Italy showed lower levels of family support ( $M = 3.25$ ,  $SD = 0.04$ ) compared to people who lived in the rest of Italy ( $M = 3.37$ ,  $SD = 0.04$ ). There was also a statistically significant main effect of Health status [ $F(1,1859) = 10.01$ ,  $p = 0.03$ ,  $\eta_p^2 = 0.06$ ]. In particular, people with a chronic disease showed lower levels of family support ( $M = 3.23$ ,  $SD = 0.05$ ) than healthy people ( $M = 3.39$ ,  $SD = 0.02$ ). The interaction was not significant [ $F(1,1859) = 2.76$ ,  $p = 0.10$ ].

### Friends' Support

There was a statistically significant main effect of Health status [ $F(1,1859) = 2.33$ ,  $p = 0.02$ ,  $\eta_p^2 = 0.06$ ]. In particular, people with a chronic disease showed lower levels of friends' support ( $M = 3.82$ ,  $SD = 0.04$ ) than healthy people ( $M = 3.94$ ,  $SD = 0.02$ ). The main effect of Italian areas [ $F(1,1859) = 2.33$ ,  $p = 0.13$ ] and the interaction were not significant [ $F(1,1859) = 1.91$ ,  $p = 0.17$ ].

### Psychological Well-Being

There was a statistically significant main effect of Health status [ $F(1,1859) = 28.76$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.06$ ]. In particular, people with a chronic disease showed lower levels of psychological well-being ( $M = 3.42$ ,  $SD = 0.04$ ) than healthy people ( $M = 3.69$ ,  $SD = 0.02$ ). The main effect of Italian areas [ $F(1,1859) = 2.60$ ,  $p = 0.11$ ] and the interaction were not significant [ $F(1,1859) = 0.01$ ,  $p = 0.93$ ].

## Pessimistic View of the Future

There was a statistically significant main effect of Health status ( $F(1,1859) = 21.42, p < 0.001, \eta_p^2 = 0.06$ ). In particular, people with a chronic disease showed a more pessimistic perception of the future ( $M = 3.66, SD = 0.04$ ) than healthy people ( $M = 3.44, SD = 0.02$ ). The main effect of Italian areas [ $F(1,1859) = 0.52, p = 0.47$ ] and the interaction were not significant [ $F(1,1859) = 0.06, p = 0.80$ ].

## Relational Well-Being

There was a statistically significant main effect of Italian areas [ $F(1,1859) = 5.86, p = 0.02, \eta_p^2 = 0.06$ ]. In particular, people who lived in northern Italy showed lower levels of relational well-being ( $M = 7.74, SD = 1.98$ ) compared to people who lived in the rest of Italy ( $M = 7.96, SD = 0.07$ ). The main effect of Health status [ $F(1,1859) = 0.66, p = 0.42$ ] and the interaction were not significant [ $F(1,1859) = 0.13, p = 0.72$ ].

## Testing the Moderator Effect of Health Status in the Association of Challenges and Resources With Individual and Relational Well-Being

A series of hierarchical multiple regressions were conducted for each outcome (psychological well-being, pessimistic view of the future and relational well-being) to examine (a) the effect of challenges (fear of contagion, worries about the consequences of the epidemic, and stress) and resources (individual: Individual coping; relational: dyadic coping; social: family support and friend support) and (b) the moderating effect of health status in the association between predictors and outcome. To reduce multiple collinearity between variables, the continuous predictors were standardized (Jaccard et al., 1990; Aiken et al., 1991; West et al., 1996; Cohen et al., 2003). Health status was dummy coded (0 = no chronic disease; 1 = presence of a chronic disease) and interaction terms were computed by multiplying the moderator with each of the seven predictors. In the first step, all predictors were included (Challenges: fear of contagion, worries about the epidemic consequences, stress; Resources: individual coping, dyadic coping, family support, friend support). In the second step, interaction terms between each predictor and health status were entered in the analysis. Simple slopes analyses were used to explore significant interactions. In order to control for Type 1 error inflation due to the large number of predictors, a Bonferroni correction for multiple comparisons was employed. Means were considered significantly different when the statistical test's  $p$ -value was less than 0.006.

## Psychological Well-Being

The regression model was significant [ $R^2 = 0.391, F(8,1640) = 131.36, p < 0.001$ ]. In particular, as reported in **Table 3**, among challenges, worries about the epidemic consequences and stress had a negative and significant effect on psychological well-being. On the contrary, the effect of fear of contagion was not statistically significant. Among people's resources, individual coping, dyadic coping, and family support

**TABLE 3 |** Testing moderator effects using hierarchical multiple regression on psychological well-being.

Step and variable	B	SE B	95% CI		$\beta$	Partial correlation
<b>Step 1</b>						
Fear of contagion	-0.049	0.022	-0.092	-0.007	-0.057	-0.275
Worries about the epidemic consequences	-0.174	0.024	-0.222	-0.127	-0.174*	-0.296
Stress	-0.119	0.022	-0.163	-0.075	-0.137*	-0.362
Individual coping (SOC)	0.372	0.022	0.328	0.415	0.436*	0.518
Dyadic coping	0.064	0.021	0.022	0.106	0.077*	
Family support	0.064	0.021	0.023	0.105	0.075*	0.108
Friends' support	0.007	0.023	-0.039	0.052	0.008	0.078
Health status	-0.152	0.040	-0.230	-0.074	-0.077*	-0.124
<b>Step 2</b>						
Health status*fear of contagion	-0.013	0.045	-0.101	0.074	-0.007	-0.134
Health status* worries about the epidemic consequences	-0.062	0.054	-0.169	0.044	-0.029	-0.170
Health status*stress	0.087	0.046	-0.004	0.178	0.048	-0.141
Health status*individual coping	0.011	0.045	-0.078	0.099	0.006	0.216
Health status*dyadic coping	-0.069	0.044	-0.156	0.018	-0.040	-0.062
Health status*family support	-0.010	0.042	-0.092	0.071	-0.006	0.025
Health status*friends'	0.010	0.045	-0.078	0.098	0.006	0.018

CI, confidence interval. \* $p < 0.006$  ( $p$ -value after the Bonferroni's correction).

had a positive and significant effect on psychological well-being. On the contrary, the effect of friends' support was not statistically significant. The effect of health status was negative and statistically significant. This means that people with a chronic disease reported lower psychological well-being than healthy people. No interaction effects were found.

## Pessimistic View of the Future

The regression model was significant [ $R^2 = 0.332, F(8,1640) = 101.989, p < 0.001$ ]. In particular, as reported in **Table 4**, among challenges, worries about the epidemic consequences and stress had a positive and significant effect on participants' pessimistic view of the future, that is the higher participants' fear of contagion, worries and stress the more pessimistic their view of the future. On the contrary, the effect of fear of contagion was not statistically significant. Among people's resources, individual coping had a negative and significant effect on the pessimistic view of the future, which means that the higher participants' individual coping the more optimistic their view of the future. On the contrary, the effects of dyadic coping, friends' and family's support were not statistically significant. The effect of health status was positive and statistically significant. This means that chronically ill people reported a more pessimistic view of the future than their healthy counterparts. The only significant interaction was between Health status and fear of contagion. The

**TABLE 4** | Testing moderator effects using hierarchical multiple regression on pessimistic view of the future.

Step and variable	B	SE B	95% CI		$\beta$	Partial correlation
<b>Step 1</b>						
Fear of contagion	0.053	0.023	0.009	0.097	0.061	0.034
Worries about the epidemic consequences	0.152	0.025	0.102	0.201	0.151*	0.088
Stress	0.262	0.023	0.216	0.307	0.301*	-0.017
Individual coping (SOC)	-0.212	0.023	-0.257	-0.167	-0.249*	0.102
Dyadic coping	-0.054	0.022	-0.098	-0.011	-0.065	
Family support	0.006	0.022	-0.036	0.049	0.008	0.076
Friends' support	0.050	0.024	0.003	0.098	0.059	0.175
Health status	0.130	0.042	0.049	0.212	0.066*	0.018
<b>Step 2</b>						
Health status*fear of contagion	0.122	0.047	0.030	0.213	0.068*	-0.017
Health status* worries about the epidemic consequences	-0.036	0.057	-0.148	0.075	-0.017	0.053
Health status*stress	0.004	0.048	-0.091	0.099	0.002	-0.004
Health status* individual coping	0.005	0.047	-0.087	0.098	0.003	0.065
Health status*dyadic coping	0.027	0.046	-0.065	0.118	0.016	-0.007
Health status*family support	0.002	0.044	-0.084	0.087	0.001	0.024
Health status*friends' support	-0.025	0.047	-0.117	0.067	-0.015	0.083

CI, confidence interval. \* $p < 0.006$  ( $p$ -value after the Bonferroni's correction).

simple slope analyses showed a significant positive effect of fear of contagion on the pessimistic view of the future only for people with a chronic disease (healthy people:  $b = 0.05$ ,  $p = 0.09$ ; people with chronic disease:  $b = 0.17$ ,  $p < 0.001$ ; **Figure 2**). No other significant interaction effects were found.

### Relational Well-Being

The regression model was significant [ $R^2 = 0.414$ ,  $F(8,1640) = 144.56$ ,  $p < 0.001$ ]. In particular, as reported in **Table 5**, the effect of predictors concerning challenges were not statistically significant. Among people's resources, dyadic coping and friends' support had a positive and significant effect on relational well-being. The effect of individual coping and family support were not statistically significant. The effect of health status was not statistically significant. The only significant interaction was between Health status and fear of contagion. The simple slope analyses showed a significant positive effect for both healthy people and people with chronic disease, though this association was stronger for healthy individuals than for chronically ill ones (healthy people:  $b = 0.70$ ,  $p < 0.001$ ; people with chronic disease:  $b = 0.50$ ,  $p < 0.001$ ; **Figure 3**). No other significant interaction effects were found.

## DISCUSSION

The present study aimed to provide a picture of the challenges (in terms of stress, fear of contagion, and worries about the epidemic consequences) as well as resources (in terms of individual and dyadic coping as well as social support from family and friends) of Italian individuals involved in a couple relationship. In particular, we analyzed the psychosocial impact of COVID-19 epidemic by comparing healthy people and people with a chronic disease, to underline potential differences between these groups, given the higher risks of contagion and related consequences for

unhealthy individuals. In addition, the role of the Italian zones in the above differences was taken into consideration, as the highest number of contagions and deaths due to COVID-19 was registered in Northern Italy. Finally, the study analyzed whether the associations of the above challenges and resources with participants' individual and relational well-being differed as a function of their health status.

With regard to the first aim of the present study, results have shown that fear of contagion, worries about the pandemic, and the total stress score were higher for people with a chronic disease than for healthy people, although moderate to high levels of these variables were observed for both healthy and chronically ill participants. These results highlight that the COVID-19 epidemic was particularly demanding for people with a chronic disease, in line with recent studies on fear of COVID-19 contagion in people with an oncological disease (Romeo et al., 2020). In fact, for cancer patients, the fear of being infected adds up to the cancer condition, with an explosion of traumatic effects. Focusing on the challenges for healthy and chronically ill people allowed us to detect the different impact of COVID-19 on these populations, showing that people with a chronic disease are more compromised by the situation both physically and psychologically. For these people, in fact, concrete challenges are added at least on two levels. First, the concrete higher risk of being infected by the virus. Secondly, given the impact of the pandemic on ordinary hospital activities, chronically ill people may fear not to be able to manage their own disease and symptoms due to the difficulties in maintaining routine medical treatments or in contacting their own physician. These demands may actually add to the stress and worries of participants living with a chronic disease.

The present findings, moreover, showed an interplay between the health status of participants and their zone of living. More specifically, people with a chronic disease who lived in the central

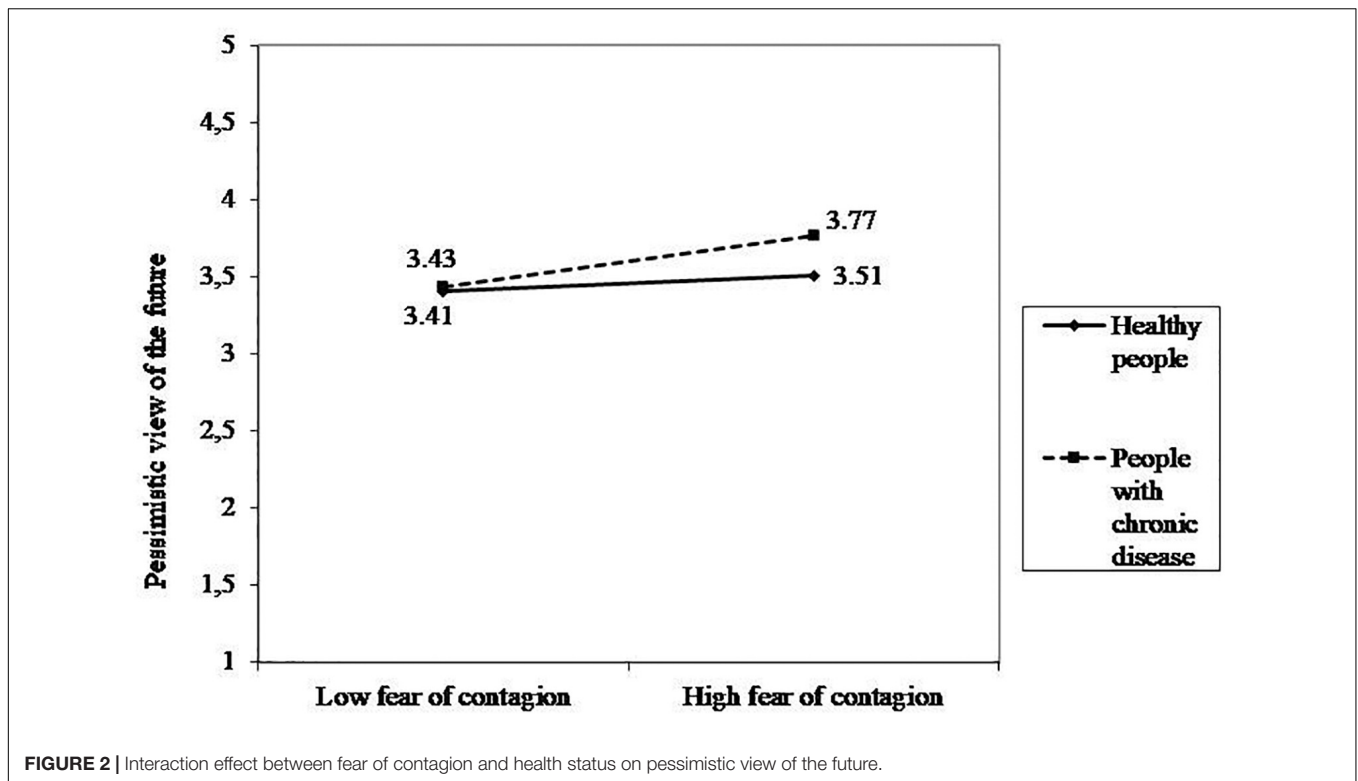


FIGURE 2 | Interaction effect between fear of contagion and health status on pessimistic view of the future.

TABLE 5 | Testing moderator effects using hierarchical multiple regression on relational well-being.

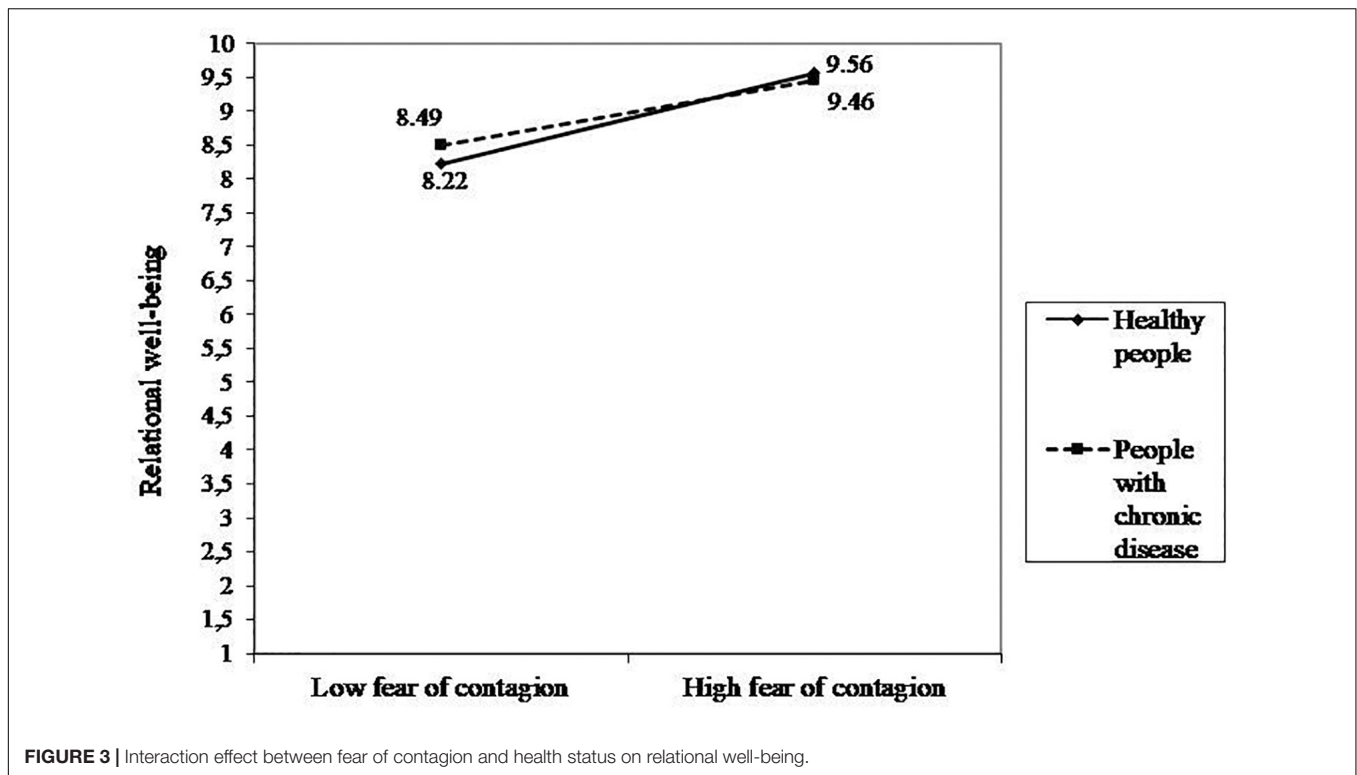
Step and variable	B	SE B	95% CI		β	Partial correlation
<b>Step 1</b>						
Fear of contagion	0.070	0.045	-0.019	0.159	0.038	0.309
Worries about the epidemic consequences	0.097	0.051	-0.003	0.197	0.045	0.304
Stress	-0.035	0.047	-0.127	0.056	-0.019	0.469
Individual coping (SOC)	0.110	0.046	0.019	0.201	0.060	-0.383
Dyadic coping	0.963	0.045	0.876	1.051	0.541*	
Family support	0.046	0.044	-0.040	0.131	0.025	0.002
Friends' support	0.222	0.049	0.126	0.317	0.122*	0.028
Health status	0.093	0.083	-0.070	0.257	0.022	0.117
<b>Step 2</b>						
Health status*fear of contagion	-0.197	0.094	-0.381	-0.013	-0.052*	0.196
Health status* worries about the epidemic consequences	0.155	0.114	-0.069	0.379	0.033	0.174
Health status*stress	0.044	0.097	-0.147	0.235	0.011	0.237
Health status* individual coping	0.074	0.095	-0.112	0.261	0.019	-0.174
Health status*dyadic coping	-0.081	0.093	-0.264	0.102	-0.022	0.016
Health status*family support	-0.030	0.087	-0.201	0.142	-0.008	-0.001
Health status*friends' support	0.050	0.094	-0.134	0.235	0.014	-0.005

CI = confidence interval. \*p < 0.006 (p-value after the Bonferroni's correction).

and southern regions of Italy, reported higher levels of fear of contagion than chronically ill people living in the North. Also, the level of stress was higher for people resident in central and southern Italy, despite the study by Casagrande et al. (2020) showed a high level of distress in northern regions. These results, considering the lowest impact of contagion in these zones, were actually unexpected. We could assume that this result may be linked to the fact that southern parts of Italy were impacted by

the epidemic at a later time than the North, when the dramatic news about the huge rate of infections and casualties in this region spread out, fomenting serious worries in the rest of Italy, especially in light of the fact that the North was renowned for its higher economic and healthcare system resources as compared to the rest of the country. In fact, the Italian healthcare system has been always decentralized and managed by regional governments and this causes a significant North-South economic divide in





favor of the wealthier regions of the North (Cersosimo and Nisticò, 2013) and this situation was further amplified by the outbreak of the COVID-19 (Armocida et al., 2020).

With regard to the area of resources, people with a chronic disease perceived lower individual and social resources than healthy participants, despite having moderate to high levels of these variables. Considering individual resources, people with a chronic disease showed lower levels of sense of coherence compared to the healthy individuals. Seems that the COVID-19 situation, combined with the challenges for the chronically ill population discussed above, decreases in this group the perception of the world and of what is happening around them as understandable, manageable, and meaningful. This is especially critical, considering that individual coping resources were found to be important protective factors in the context of COVID-19 emergency stress (Vagni et al., 2020b). Specific attention should therefore be devoted to sustain chronically ill individual's coping competences.

With regard to social resources, family and friends' support levels were high for both groups, but lower for chronically ill participants. It could be that living with a chronic disease, with all the demands that this imposes on individuals' daily lives, may impair chronically ill people's social lives. Some evidence exists, for example, that individuals living with a chronic disease experience more loneliness than healthy individuals, even though their social network size and emotional support exchanges does not differ as a function of disease status (Penninx et al., 1999).

Furthermore, it was observed that the level of dyadic coping was moderate to high in both groups and it was independent of the health status. According to the literature on dyadic coping,

we could assume that partners cope together in facing a common stressor as shown both on healthy population (Bodenmann, 2005; Donato et al., 2009; Donato and Parise, 2012; Donato et al., 2015; Pagani et al., 2019) and in people with a chronic disease (Bertoni et al., 2015; Rapelli et al., 2020). This specific dyadic skill in both healthy and unhealthy participants emphasizes, firstly, the interdependence of partners' stress and coping experience and, secondly, the coping process with external stressors as in the case of COVID-19. Given that dyadic coping is a relational competence that partners develop with both minor and major stressors (Bodenmann, 1997; Donato, 2014), both groups may have plenty of occasions to exercise their dyadic coping. Furthermore, we could recognize that Italian couples showed good resources in their couple relationship. The maintaining of a high-quality romantic relationship during times of stress—such as in the case of the COVID-19 pandemic—is very challenging (e.g., Neff and Karney, 2004), as demonstrated also by the divorce rates during COVID-19 lockdown in China and future longitudinal research should examine how partners may adapt to this situation in the long run.

Finally, as far as well-being is concerned, people with a chronic condition showed lower levels of psychological well-being and higher levels of a pessimistic view of the future (Ramírez-Maestre et al., 2019; Rapelli et al., 2020). Besides, relational well-being was similar between the two subgroups and, as previously demonstrated in the literature, a high-quality romantic relationship could be a useful resource to face daily stress (Donato et al., 2009; Donato and Parise, 2012; Donato et al., 2015; Pagani et al., 2019) and also to cope with the pandemic-related stress (Balzarini et al., 2020; Donato et al., in press).

With regard to the second aim of the study, tests of the associations of challenges and resources with individual outcomes showed that worries about the epidemic consequences and stress were negatively associated with psychological well-being, conversely resources area were positively associated with it.

With reference to the resource portfolio of partners, participants' sense of coherence, that is how meaningful and integrated people view life and the world around them, was positively associated with psychological well-being. This finding confirms what previously found for healthy people (Eriksson and Lindström, 2007) as well as for people afflicted with serious illnesses and disabilities (Anderson, 1998). For example, in chronic patients, sense of coherence was associated with hope and lower symptoms of anxiety and depression (Möllerberg et al., 2019). In a salutogenic perspective, these results suggest that during a pandemic situation it is important to take into consideration also the individual coping strategies and to promote them in order to cope with stress.

Furthermore, dyadic coping and support from family and friends were positively associated with psychological well-being, in line with the literature that explored the supportive role of relationships and their positive effect on well-being among healthy and unhealthy populations (Falconier and Kuhn, 2019).

In particular, dyadic coping was associated with different positive outcomes (Hilpert et al., 2016; Parise et al., 2019), suggesting that having a supportive partner especially during an emergency situation like a global pandemic may alleviate stress, help sharing common difficulties, and improve partners' psychological well-being. In fact, when an external and shared stressor, like the COVID-19, outbreaks, relying on the partner and on couple skills becomes essential. Moreover, social support could be considered as a crucial protective factor, especially during the COVID-19 epidemic, as previous studies reported that the presence of a social support could help managing a stressful and traumatic event, like for example an illness (Cutrona et al., 2018).

In an opposite direction were the results on participants' view of their future, in fact worries about the epidemic consequences and stress were positively related to a pessimistic perception of future, the more people reported worries about the COVID-19 situation and the higher their levels of stress, the more pessimistic was their view of the future. Moreover, the significant interaction effect showed that the fear of contagion increased a pessimistic view of the future only for people with a chronic condition. This finding confirms a central role in this emergency situation of fear and uncertainty about the epidemic progression on mental health (Casagrande et al., 2020), as demonstrated also in past virus outbreaks (e.g., Pappas et al., 2009), for people suffering for a chronic disease. In fact, in this population the risk of contagion was higher and the consequences more dangerous. These results indicate that the fear of contagion may crystallize in the present the person with chronic disease, so that the perception of a (good) future is unthinkable. Conversely, higher levels of individual resources protected against a pessimistic perception of the future. In fact, the perception of having a good individual coping was negatively associated with the pessimistic perception of the

future, as the person may perceive control over the situation even if it is stressful and a sense of competence in coping with it.

With regard to participants' relational well-being, interestingly, the significant interaction showed that the association of fear of contagion with relational well-being of participants was positive and significant for both healthy and chronically ill participants, though it was weaker for people with a chronic disease. This result seems to suggest that during COVID-19, when social relationships were reduced due to strict isolation and social distancing, the more people were afraid of an external threat like the virus, the more they perceived their couple relationship as satisfactory. This apparently counter-intuitive finding could have at least two explanations: first, people may need close support and to perceive it positively to cope with the threat of the virus; secondly, the unusual closeness and time spent together as a couple due to the lockdown could allow participants to increase their marital quality. Furthermore, if, on the one hand, fear of contagion precludes the perception of an optimistic future for chronically ill people as previously discussed, on the other hand, it reveals its "generative" effect by activating relational resources and becoming an occasion to test the strength of the couple's relation, both for the sick and the healthy participants (Donato et al., in press). In fact, the fear of contagion seems to strengthen the couple's bond, the partners are more united to fight a common enemy (the virus) and therefore more satisfied with their relationship.

With reference to resources, dyadic coping and friends' support were significantly associated with participants' relational well-being and in a positive direction. In time of COVID-19 in fact, perceived good support from the partner or friends (but not from family) was associated with a positive perception of participants' relational well-being. In light of the importance of the quality of the couple relationship for people's physical and mental health (Donato and Parise, 2015; Pagani et al., 2015; Donato et al., 2018b; Pagani et al., 2020), these findings highlight several key avenues professionals could take in order to sustain and promote both healthy people's and chronically ill individuals' couple relationships.

The results of the present study also underline the importance of taking a privileged look in the category of subjects with chronic disease, most affected by the current health emergency. In particular, the present findings have implications for the development of target interventions for the most vulnerables' needs, which take psychological and social (as well as medical) aspects into consideration. In particular, interventions could pay attention to activities devoted to reduce stress and enhance individual and dyadic coping skills of chronic patients as well as promote social support (e.g., through the activation of online groups).

To the best of our knowledge, our study is the first to explore the psychosocial effects of the COVID-19 emergency in the Italian population focusing on participants in couples, with and without a chronic disease. Furthermore, another strength of the study was the focus on both challenges and resources: in an effort to respond to the pandemic it is essential to know what are the most relevant challenges people live as well as the available resources to activate. Resources, moreover, were

analyzed in terms of individual, relational, and social ones: in accordance with Bronfenbrenner's (1979) ecological systems theory, in fact, individuals are embedded within interconnected systems pertaining to the person, his/her relationships, as well as the social and cultural environment in which they live in and taking into account all this different levels, beyond the individual one, is another strength of the present study. The validity and implications of the present findings should be considered in light of some limitations. First, the present study had a cross-sectional design, which means no conclusions can be drawn with respect to the causality of the observed relationships and directionality of relations between variables. Future research should adopt a longitudinal design in order to help address these issues. Second, this study is based on the comparison between two unequally sized groups (unhealthy vs. healthy participants), as it was not primarily designed to make such comparison, and no information about the type of chronic disease of our sample was collected. Future research should use comparable samples and collect more information on participants' chronic conditions. In addition, pre-COVID measures of variables were not possible in the current study. A final limitation has to do with the exclusive reliance on quantitative approach.

Further research could rely on qualitative measures in order to deeply capture the complexity of the experience of living with a chronic disease during a pandemic.

Again, future longitudinal studies could clarify the changes over time and the direction of the associations. Finally, in future research, the directions identified in this study connected to the importance of resources, at an individual, relational, and social level, to face a critical event might be expanded and better analyzed: In fact, the assumption of a salutogenic perspective could promote a better understanding of the situation considering both risks and protective factors and could be useful also for clinicians who have to sustain people with chronic disease. In fact, not only high levels of stress, but also low levels of individual and relational resources could be

harmful. To conclude, the COVID-19 epidemic had an impact on different levels and the present results highlight how focusing on both the challenges to face and the resources to sustain may help highlight important avenues for intervention. From a psychological point of view, although chronically ill individuals are especially challenged during this situation and perceive less resources, their resources may be a relevant leverage to use for sustaining their psychosocial well-being in the aftermath of the pandemic.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of the Department of Psychology of the Catholic University of Sacred heart (protocol number 15–20). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

GR and GL contributed equally to the research. In particular, they contributed to the development of the theoretical framework, to the performance of the statistical analyses, to the analysis of the results, and to the writing of the manuscript. SD, AP, and MP contributed to the development of the theoretical framework and to the writing of the manuscript. AB and RI supervised the writing of the manuscript. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Organizational Justice, Professional Identification, Empathy, and Meaningful Work During COVID-19 Pandemic: Are They Burnout Protectors in Physicians and Nurses?

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Burnout has been recognized as a serious health problem. In Portugal, before COVID-19 Pandemic, there were strong indicators of high prevalence of burnout in physicians and nurses. However, the Portuguese Health Care Service was able to efficiently respond to the increased demands. This study intends to understand how psychosocial variables might have been protective factors for burnout in physicians and nurses in Portugal. Specifically, we considered several psychosocial variables that have been found to be protective factors for burnout in previous research and we compared their predictive and unique impact in the prediction of burnout. These variables are perceptions of justice (distributive, procedural, justice from colleagues, justice from patients, and their families), professional identification, meaningful work and empathy. We also included workload, as a risk factor, and controlled other variables that can be confounds for burnout, such as socio-demographic variables, ideological variables (religiosity, political orientation), and specific variables related with COVID-19 pandemic. The sample of the present study is composed by 229 physicians (aged between 23 and 70 years old,  $M = 36.54$ ;  $SD = 10.72$ ; 48% male and 52% female) and 268 nurses (aged between 22 and 69 years old,  $M = 34.96$ ;  $SD = 9.52$ ; 27% male and 73% female). An online survey was created using Qualtrics and participants were recruited via Facebook and LinkedIn. The data were collected during 29 days (between the 45th and the 74th days after the first diagnosed case of COVID-19 in Portugal). The results showed that workload was a significant risk factor, except for disengagement in physicians. The most consistent protectors across samples were procedural justice (for both dimensions of burnout, both in physicians and nurses) and professional identification (for disengagement, both in physicians and nurses; for exhaustion only in physicians). This study suggests that decreasing workload and promoting procedural justice and professional identification are key factors that might be simultaneously and independently addressed in interventions for reducing the risk of burnout or preventing it from occurring in the first place.

**Keywords:** burnout, organizational justice, professional identification, social identity, empathy, meaningful work, workload, health care workers

## INTRODUCTION

Burnout has been defined as a psychological syndrome of exhaustion, cynicism, and inefficacy resulting from ongoing occupational stressors (Leiter and Maslach, 2003), and that can take place in any kind of occupation (Leiter and Schaufeli, 1996).

Burnout has been recognized as a serious health problem and, particularly, the high incidence of burnout in physicians (West et al., 2018, for a review) and nurses (Woo et al., 2020, for a review) has been recognized as a threat, not only to the professionals themselves but also to their patients and the organizations in which they work. Indeed, burnout has been found to be associated with decreased mental and physical health of health care workers; lower quality care, threats to patient safety, and lower patient satisfaction; and reduced productivity, increased turnover and increased costs of the health care system (for a review in physicians see West et al., 2018; for a review in nurses see Bakhamis et al., 2019).

In Portugal, before COVID-19 Pandemic, there were strong indicators of high prevalence of burnout in physicians and nurses. In a study with a national sample of 9,176 of Portuguese physicians, it was found that 66% of them were in a high level of emotional exhaustion (Vala et al., 2017). In a sample of 1,262 nurses, also at a national level, about 50% had a high level of burnout (Marôco et al., 2016).

However, as stated by the President of the Order of Physicians (Guimarães, 2020), the Portuguese Health Care Service (Serviço Nacional de Saúde—SNS), was able to efficiently respond to the increased demands of the COVID-19 Pandemic. This may be considered somehow surprising. Indeed, despite the high levels of burnout already present in health care workers (Vala et al., 2017), they had to deal with the increased stress caused by the Pandemic (Bavel et al., 2020), and specifically as health care workers they faced additional stressors, such as increased workload, high risks of contagion and, many of them, isolation from their own families (Guimarães, 2020).

Research has shown that perceptions of justice, social identification, meaningful work and empathy are associated with burnout. However, that same research have been conducted under separate theoretical frameworks and the impact of these different predictors have not been tested together. Moreover, those same studies have not consistently included other variables related with work, socio-demographic variables and ideological variables, that can also impact on burnout.

The present paper has two main goals. The first goal is to identify the core psychosocial variables might have been protective factors for burnout in physicians and nurses in the first 2 months of the COVID-19 pandemic in Portugal, comparing their predictive and unique impact in the prediction of burnout. The variables considered were perceptions of justice (distributive, procedural, justice from colleagues, justice from patients, and their families), professional identification, meaningful work, and empathy. We also controlled for workload as a risk factor, and for other variables that can be confounds for burnout, such as socio-demographic variables (age, sex, income), ideological variables (religiosity, political orientation), and specific variables related

with COVID-19 pandemic. The second goal is to understand how these variables might relate theoretically to explain burnout.

In the next section we will briefly review the literature related with each of the theoretical variables considered.

## Burnout

Burnout was first described by Freudenberger (1974) and mostly developed by Maslach (1976) in collaboration with other researchers (Schaufeli et al., 2009). It has been conceived as a cumulative reaction to ongoing occupational stressors and defined originally as a three-dimensional psychological syndrome of exhaustion, cynicism, and inefficacy (Leiter and Maslach, 2003): the exhaustion component refers to feelings of being overextended and depleted of one's emotional and physical resources; cynicism component (also known as depersonalization or disengagement) refers to a negative, callous, or excessively detached response to various aspects of the job, that is self-protective of exhaustion, and can result in the loss of idealism and the dehumanization of others; the inefficacy refers to feelings of incompetence and a lack of achievement and productivity at work.

Later on, a two-dimensional approach emerged with exhaustion and cynicism as the two core dimensions of burnout, with inefficacy being considered as a possible consequence of burnout (e.g., Bakker et al., 2004). This is the approach we will be using in the present study (Oldenburg Burnout Inventory, OLBI, Bakker et al., 2004), with the two dimensions of burnout named as exhaustion and disengagement. The exhaustion dimension refers to feelings of physical fatigue and overload in relation to work (Demerouti and Bakker, 2008). The dimension of disengagement refers to the distance from work and negative attitudes toward own work (Bakker et al., 2004).

## Workload

The workload refers to overload, when job demands exceed human limits (Maslach et al., 2001). It is one of the core risk factors for burnout development when it is a chronic job condition and not an occasional emergency (Leiter and Maslach, 2003).

Both the Six Areas of Work Life Model (Leiter and Maslach, 2003; Brom et al., 2015) and the Job Demands—Resources Theory (Demerouti et al., 2001), consider workload a key variable to explain burnout.

## Justice Perceptions

Since the genesis of the Social Justice theories (Stouffer et al., 1949; Adams, 1965), perceived justice has been found to be an important predictor of satisfaction and well-being. More recently, organizational justice has been identified as an important predictor of health (Elovainio et al., 2002b) and of burnout (Maslach et al., 2001). Several dimensions of justice have been considered: distributive, procedural and interactional.

Distributive justice refers to the perception that the resources that are allocated to people are “deserved” or not, according to their contributions (Adams, 1965). If the reward obtained is proportional to the contribution, the situation is considered as just; if not, it is considered as unjust. The judgment of fairness

may be comparative, with another person or with the same person in the past, or may be done in absolute terms.

Procedural justice refers to the fairness of the means by which distributions, or decisions about them, are made (Thibaut and Walker, 1975). Apart from the possibility of “having a voice” (Thibaut and Walker, 1975) in this process, a fair procedure has to be based on accurate information; and the patterns and criteria for decision-making have to be consistent (across people and time) and there should be a possibility of reversing decisions (Leventhal, 1980).

Interactional justice (Bies and Moag, 1986) refers to the respectful and proper manner by which authorities communicate procedural details and justify their decisions using honest and truthful information.

Not much studies have assessed and compared the unique impact of these three dimensions of organizational justice in burnout. With the intention of contributing to fill this gap, Moliner et al. (2005) found that distributive, procedural and interactional justice were all negatively associated with both cynicism and exhaustion but when considered together only procedural justice was a significant predictor of both dimensions of burnout. We believe that one reason for this might have been the high correlation between procedural and interactional dimensions. In this case, it is recommended to aggregate the measure in one procedural/interactional dimension, so that it is possible to avoid the costs of multicollinearity (Colquitt, 2012). This aggregation of the procedural and interactional justice in only one dimension is also in agreement with the Group Value Model (Tyler and Lind, 1992; Tyler, 1994) that includes both procedural and interactional aspects of justice in the conceptualization of a unique dimension named simply “procedural justice.”

The impact of justice perceptions on well-being can also be conceptualized as a buffer (Bobocel and Hafer, 2007) that serves to protect individuals of major stressors and decreases the impact of demands (a moderator hypothesis between workload and justice concerns).

In the present study we included other dimensions of justice that we think are particularly relevant for physicians and nurses, such as justice of colleagues, patient justice and family patient's justice. Previous studies in physicians (Smets et al., 2004) showed that perceived injustice from colleagues was associated with exhaustion, and perceived injustice from patients was associated with both exhaustion and depersonalization. As far as we know, no previous studies have addressed the impact of perceived patient family justice on burnout. However, it was found that aggressive behavior (incivilities) from patients and their families, which can be considered as a proxy of perceived injustice, was associated with burnout (Campana and Hammoud, 2013).

## Professional Identification

Since the first studies that experimentally showed the impact of intergroup categorization (Tajfel et al., 1971), the concept of social identity and its implications for intergroup relations and well-being started to get attention from researchers.

Tajfel (1978) defined social identity as “that part of an individual's self-concept which derives from his [or her]

knowledge of his [or her] membership of a social group (or groups) together with the value and emotional significance attached to that membership” (p. 63). People belong to a variety of groups, and they may differ in the strength of the sense of membership, which is conceptualized as social identification (Turner et al., 1987). This strong sense of membership with a social group (that at the organizational level may be either the organization or the work team), has shown to be an important protector of health and well-being (Jetten et al., 2012) and an important protector for burnout (Avanzi et al., 2015, 2018).

The relation between social identification and burnout has been conceptualized in two different ways: social identity mediating the relation between procedural justice and well-being (self-esteem, the group-value model, Tyler et al., 1996) and social identification predicting a reduction in workload which in turn reduces burnout (Avanzi et al., 2018).

Because, in Portugal it is very common that physicians and nurses work in more than one organization, in this study, instead of identification with organization, we considered a measure of identification with the profession.

## Meaningful Work

Hackman and Oldham (1976) defined meaningfulness of the work as “the degree to which the employee experiences the job as one which is generally meaningful, valuable, and worthwhile” (Hackman and Oldham, 1976, p. 256). Although more recent conceptualizations of meaningful work have been proposed (Pratt and Ashforth, 2003; Steger et al., 2012) they incorporate the essence of this definition.

Meaningful work has mostly found to be an important protector of well-being at work (Duffy et al., 2012; Steger et al., 2012; Yaseen, 2013) and burnout (e.g., Borritz et al., 2005; Fouché et al., 2017), including burnout in physicians (Rasmussen et al., 2015) and nurses (Tei et al., 2014). However, recently Jones and Griep (2018) showed that meaningful work can also be a risk factor for burnout because it may lead employees to continue increasing their efforts beyond their limits.

## Empathy

Empathy is generally considered to be a two-dimensional construct with an affective dimension and a cognitive dimension (Mehrabian, 1997). The affective dimension refers to the capability to share another person's emotional state (Eisenberg and Strayer, 1987), and the cognitive dimension of empathy, refers to the ability to understand (not necessarily share) another's emotional state (Davis, 1994).

Both emotional and cognitive empathy of physicians and nurses have been found to be beneficial for the quality of care and for patient satisfaction (Wilkinson et al., 2017; Samra, 2018, for reviews). However, there is less agreement about the benefits of empathy for health care workers, with two competing hypothesis, that empathy might be either a protective or a risk factor for burnout (Zenasni et al., 2012). The results are indeed not conclusive. In a recent systematic review of 10 studies correlating empathy and burnout in health care professionals (Wilkinson et al., 2017), eight of the studies provided empirical support for a negative relationship between empathy and burnout, one study



provided support for a positive relationship between burnout and empathy, and one study reported contradictory evidence with positive and negative correlations between different subscales of the empathy and burnout measures.

In this study we will try to contribute to address this issue and we will consider affective and cognitive empathy as distinct dimensions of empathy.

## Control Variables

We controlled for several variables that may affect the proposed relationships but that were not of direct theoretical interest. We controlled for respondents' age and gender because both variables have been found to affect burnout in physicians and nurses (e.g., Maslach and Leiter, 2017; West et al., 2018). We also controlled for the participants' years of professional experience because their predictive role in burnout in these professionals has been demonstrated previously (e.g., Marôco et al., 2016; Meira et al., 2017).

Income was also included because it is an important predictor of well-being (Lucas and Schimmack, 2009).

We controlled for religion and political orientation of the participants because religion is an important predictor of well-being (Koenig, 2012) and is usually associated with a more right wing political orientation (Correia et al., 2018).

Finally, questions related to COVID-19 pandemic (trust in policies, tasks changed and isolation the family) that might have been additional stressors for the health care professionals were also included as control variables.

In sum, in the present study we expect workload to be a risk factor for both dimensions of burnout both in physicians and nurses; we expect justice perceptions and professional identification to be protectors of burnout. We do not make specific predictions for meaningful work and empathy, because previous studies have found they may be either protector or risk factors. Furthermore, we will test if all the previous associations continue to be significant over and above the control variables.

## MATERIALS AND METHODS

### Participants

Table 1 presents the descriptive statistics for control variables and Table 2 presents the descriptive statistics for the theoretical variables.

The sample of the present study was composed by 229 physicians (aged between 23 and 70 years old,  $M = 36.54$ ;  $SD = 10.72$ ; 48% male and 52% female) and 268 nurses (aged between 22 and 69 years old,  $M = 34.96$ ;  $SD = 9.52$ ; 26.9% male and 73.1% female).

About 58.5% of physicians and 58.2% of nurses worked in the public sector, 7.9% physicians and 21.6% nurses worked in the private sector and 33.6% physicians and 20.1% nurses worked in both sectors.

The average number of years of participants exercising their profession was around 11 years ( $M = 11.23$ ;  $SD = 10.65$ , for physicians;  $M = 11.72$ ,  $SD = 9.24$ , for nurses). The participants were from all regions in the country, but mostly

from Metropolitan Area of Lisbon (43.7% physicians; 46.3% nurses), Center (15.3% physicians; 19.4% nurses) and North (17.9% physicians; 13.4% nurses) (Table 3).

A total of 43.2% physicians and 39% nurses were isolated from their nuclear family due to the COVID-19 pandemic and about 82.5% physicians and 60.4% nurses have changed their functions due to this pandemic. Most participants considered

TABLE 1 | Descriptive statistics for control variables.

Control variables	Physicians $N = 229$	Nurses $N = 268$
<b>Sex (%)</b>		
Male	48	27
Female	52	73
Age (M/SD)	36.54 (10.72)	34.96 (9.52)
<b>Nationality (%)</b>		
Portuguese	94.8	99.3
Other	5.2	0.7
Religiosity (M/SD)	2.84 (1.17)	2.84 (1.07)
Political orientation (M/SD)	3.08 (0.87)	3.00 (0.79)
years of professional experience (M/SD)	11.23 (10.65)	11.72 (9.24)
<b>Sector (%)</b>		
Public	58.5	58.2
Private	7.9	21.6
Both	33.6	20.1
Income (M/SD)	3.11 (0.71)	2.73 (0.70)
Trust in policies (COVID-19) (M/SD)	4.50 (0.72)	4.44 (0.72)

TABLE 2 | Descriptive statistics for theoretical variables.

Theoretical variables	Physicians $N = 229$	Nurses $N = 268$
Exhaustion (M/SD)	3.07 (0.65)	3.10 (0.60)
Disengagement (M/SD)	2.69 (0.71)	2.76 (0.70)
Workload (M/SD)	3.06 (1.01)	3.32 (1.00)
Empathy cognitive (M/SD)	4.05 (0.42)	3.95 (0.36)
Affective empathy (M/SD)	2.98 (0.77)	2.94 (0.79)
Meaningful work (M/SD)	4.58 (0.55)	4.47 (0.55)
Justice of colleagues (M/SD)	3.92 (0.65)	3.84 (0.57)
Patient justice (M/SD)	4.18 (0.64)	4.06 (0.66)
Family patient justice (M/SD)	4.02 (0.70)	3.85 (0.74)
Distributive justice (M/SD)	2.22 (0.87)	1.93 (0.74)
Procedural justice (M/SD)	2.90 (0.88)	2.93 (0.80)
Professional identification (M/SD)	4.65 (0.65)	4.50 (0.70)

TABLE 3 | Percentage distribution of participants by area of residence.

Area of residence	Physicians (%) $N = 229$	Nurses (%) $N = 268$
North	17.9	13.4
Center	15.3	19.4
South	11.4	11.2
Metropolitan area Lisbon	43.7	46.3
Metropolitan area Oporto	8.7	5.6
Azores/Madeira Island	1.3	1.1
Other countries	1.7	3.0

that the policies adopted by their country to combat the COVID-19 pandemic were adequate (physicians:  $M = 4.50$ ,  $SD = 0.72$ ; nurses:  $M = 4.44$ ,  $SD = 0.72$ ).

## Procedure

This study received Ethical approval by the Portuguese Order of Psychologists (OPP—Ordem dos Psicólogos Portugueses), in the framework of an initiative to support scientific research in health psychology and behavior change (Via Verde de Apoio OPP para a Investigação Científica em Saúde Psicológica e Mudança Comportamental).

An online survey was created using Qualtrics and participants were recruited via Facebook and LinkedIn<sup>1</sup>. The link for the study was also available at the website of the Portuguese Order of Psychologists.

At the beginning of the survey, the participants were informed about the general purpose of the study. Participants were informed that the study was non-invasive, there were no physical, financial, social, legal or other risks connected with the study and the results would be analyzed anonymously. It was also explained that they could withdraw from the study by closing the web browser without their responses being recorded.

The contact of the person responsible for the project was given in case they wished to obtain additional information or had any questions about the study.

After providing informed consent and agreeing to participate, they were presented with the main measures. In the last block of the survey, participants were asked to provide demographic and professional information and questions related to the Pandemic COVID-19.

At the end, the participants were debriefed and the theoretical variables of the study were indicated. The participants were thanked for their participation, and the contact of the person responsible for the project was again provided.

The average completion time of the survey was 10 min. The data were collected during 29 days (between the 45th and the 74th days after the first diagnosed case of COVID-19 in Portugal, in most of this time the country was in lockdown).

## Measures

### Burnout

We used the Portuguese adaption (e.g., Sinval et al., 2019), of the Oldenburg Burnout Inventory (OLBI, Bakker et al., 2004). The OLBI has sixteen items and consists of two dimensions with eight items each: exhaustion (e.g., “There are days when I feel tired before I arrive at work,” physicians  $\alpha = 0.83$ ; nurses  $\alpha = 0.81$ ) and disengagement (e.g., “It happens more and more often that I talk about my work in a negative way,” physicians  $\alpha = 0.86$ ; nurses  $\alpha = 0.83$ ). Responses were given on a five-point scale, 1 = “totally disagree” to 5 = “totally agree.”

<sup>1</sup>We did not address specific groups of nurses and physicians. We addressed nurses and physicians individually and, in many cases, they shared the link with other professionals. Although the link of the questionnaire was available in the Portuguese Order of Psychologists, this happened only in the last days of the collection of data, and the specific location on that website is not specifically intended to be consulted by physicians and/or nurses.

### Justice Perceptions

Distributive justice was assessed with three items (e.g., “In general, the rewards I receive are fair,” physicians  $\alpha = 0.82$ ; nurses  $\alpha = 0.82$ ) taken from the five item distributive justice scale developed and validated by Rego to the Portuguese population (2000). The items were answered in a scale from 1 = “totally disagree” to 5 = “totally agree.”

Procedural justice was assessed with three items (e.g., “My organization has a mechanism that allows employees to appeal decisions”) taken from the four item scale of procedural justice scale of Rego (2000) and with three items (e.g., “My superior treats me with respect and consideration”) taken from the five item scale of interactional justice developed and validated by Rego (2000). An aggregated index of procedural justice was composed with the mean of the items used to measure procedural justice and interactional justice (physicians  $\alpha = 0.88$ ; nurses  $\alpha = 0.88$ ). We thus avoided multicollinearity issues, due to the high correlation between procedural and interactional justice (physicians  $r = 0.68$ ; nurses  $r = 0.66$ ).

Justice of colleagues was measured using two items (e.g., “My colleagues appreciate my work,” “My colleagues acknowledge my work,” physicians  $\alpha = 0.82$ ; nurses  $\alpha = 0.84$ ).

Patients justice was measured using two items (“My patients recognize my work,” “My patients acknowledge my work”). Justice of patient family members was assessed using two items (“My patients’ relatives recognize my work,” “My patients’ relatives acknowledge my work”). For these items, a five-point response scale was used: 1 = “totally disagree” to 5 = “totally agree.” Because there was a very high correlation between patient justice and family patients justice (Table 4, physicians  $r = 0.75$ ; Table 5, nurses  $r = 0.76$ ), and to avoid multicollinearity issues, we calculated an aggregated index of patient and family patient’s justice (physicians  $\alpha = 0.92$ ; nurses  $\alpha = 0.91$ ) to use on the regression analysis.

### Professional Identification

This construct was measured with one-item measure (“I identify with my profession”) and the responses were given on a five-point scale ranging from 1 (“totally disagree”) to 5 (“totally agree”). This item was adapted from the one item measure of organizational identification used by Postmes et al. (2012) (“I identify with the organization I work for”).

### Meaningful Work

Meaningful Work was evaluated with two items (“The work I do serves a greater purpose,” “I know my work makes a positive difference in the world”; physicians  $\alpha = 0.77$ ; nurses  $\alpha = 0.72$ ) taken from The Work and Meaning Inventory (WAMI) (Steger et al., 2012): with a five-point response scale ranging from 1 = “totally disagree” to 5 = “totally agree.”

### Empathy

Empathy was measured using the Portuguese Adaptation of the Basic Empathy Scale short version (BES-A) (Pechorro et al., 2018). This version is a translation and validation of a shorter version (Salas-Wright et al., 2012) of the Basic Empathy Scale (BES) (Jolliffe and Farrington, 2006). This BES-A version has

**TABLE 4 |** Correlations between study variables in physicians ( $N = 229$ ).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Exhaustion	–																			
2. Disengagement	0.58***	–																		
3. Sex	0.10	–0.14*	–																	
4. Age	–0.14*	–0.10	–0.10	–																
5. years of professional experience	–0.10	–0.08	–0.08	0.97***	–															
6. Income	–0.24***	–0.17**	–0.02	0.09	0.11	–														
7. Religiosity	–0.06	–0.13	0.17*	0.17*	0.18**	–0.03	–													
8. Political orientation	–0.04	0.06	–0.00	–0.05	–0.02	–0.07	0.20**	–												
9. Isolated the family (COVID-19)	–0.06	–0.00	–0.01	0.24***	0.24***	0.10	0.23**	–0.03	–											
10. Task changes (COVID-19)	–0.03	–0.04	–0.09	0.11	0.10	0.06	–0.06	–0.07	0.01	–										
11. Trust in policies (COVID-19)	–0.16*	–0.14*	–0.06	0.05	0.02	0.08	0.01	–0.16*	0.10	–0.10	–									
12. Workload	0.39***	0.25***	0.05	–0.17*	–0.15*	–0.19**	–0.11	0.08	–0.07	–0.02	–0.05	–								
13. Empathy cognitive	–0.03	–0.14*	0.17**	–0.05	–0.07	0.01	–0.01	–0.05	–0.18**	0.04	0.05	0.01	–							
14. Empathy affective	0.06	–0.00	0.00	–0.01	–0.02	0.10	–0.02	–0.12	–0.04	–0.01	0.10	0.00	0.01	–						
15. Meaningful work	–0.07	–0.26***	0.15*	0.00	0.01	0.07	0.12	0.11	–0.06	–0.01	0.07	–0.06	0.23**	0.03	–					
16. Justice of colleagues	–0.14*	–0.21**	–0.11	–0.07	–0.09	0.16*	–0.01	–0.00	–0.03	–0.13	0.08	–0.03	0.12	0.25***	0.26***	–				
17. Patient justice	–0.03	–0.13*	–0.03	0.12	0.10	0.05	0.00	0.07	–0.10	0.04	–0.09	0.01	0.24***	0.14*	0.24***	0.25***	–			
18. Family patient justice	–0.11	–0.21**	–0.06	0.15*	0.13	0.10	0.03	–0.05	–0.07	0.04	–0.05	–0.07	0.16*	0.15*	0.08	0.24***	0.75***	–		
19. Distributive justice	–0.33***	–0.22**	–0.03	0.10	0.10	0.37**	0.04	–0.08	0.19**	0.02	0.17*	–0.35***	0.01	0.19**	–0.08	0.09	0.01	0.08	–	
20. Procedural justice	–0.44***	–0.47***	–0.05	–0.02	–0.02	0.18**	0.17*	0.01	0.08	–0.01	0.16*	–0.35***	0.10	0.13	0.15*	0.29***	0.01	0.09	0.43***	–
21. Professional identification	–0.26***	–0.41***	0.08	0.12	0.10	0.09	0.19**	0.11	–0.06	–0.05	0.00	–0.02	0.11	–0.02	0.31***	0.16*	0.25***	0.17**	0.07	0.12

For all measures, scores were computed by averaging across items, with higher scores indicating stronger endorsement of the construct. For sex, 1 indicates "male" and 2 "female." \* $p < 0.05$ ; \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**TABLE 5** | Correlations between study variables in nurses ( $N = 268$ ).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Exhaustion	–																			
2. Disengagement	0.49***	–																		
3. Sex	0.16**	–0.01	–																	
4. Age	–0.17**	–0.09	–0.16*	–																
5. years of professional experience	–0.19**	–0.09	–0.11	0.93***	–															
6. Income	–0.29***	–0.21**	–0.03	–0.04	0.01	–														
7. Religiosity	–0.07	–0.19**	–0.02	0.18**	0.17**	–0.06	–													
8. Political orientation	0.00	0.02	0.00	0.08	0.08	0.00	0.14*	–												
9. Isolated the family (COVID-19)	–0.09	–0.06	–0.00	0.20**	0.18**	–0.07	0.14*	–0.02	–											
10. Task changes (COVID-19)	–0.13*	–0.10	–0.06	0.08	0.11	0.12	–0.04	–0.04	0.10	–										
11. Trust in policies (COVID-19)	–0.24***	–0.17**	0.02	–0.04	0.02	0.04	0.08	–0.12	0.02	0.07	–									
12. Workload	0.52***	0.40***	0.10	–0.16**	–0.15*	–0.21**	–0.13*	–0.07	–0.11	–0.15*	–0.20**	–								
13. Empathy cognitive	0.11	–0.02	0.08	0.02	0.05	–0.14*	0.10	0.04	–0.07	–0.23***	0.08	0.10	–							
14. Empathy affective	0.23***	0.08	0.15*	–0.05	–0.02	–0.05	–0.02	–0.03	0.05	–0.04	–0.01	0.11	0.06	–						
15. Meaningful work	–0.16*	–0.36***	0.04	0.06	0.08	0.04	0.12*	–0.16**	0.07	0.01	0.01	–0.12	0.22***	0.00	–					
16. Justice of colleagues	–0.15*	–0.32***	–0.07	0.13*	0.09	–0.01	0.12	0.11	–0.04	0.04	0.04	–0.14*	0.09	–0.07	0.20**	–				
17. Patient justice	–0.13*	–0.27***	–0.11	0.06	0.06	–0.08	0.16**	–0.02	–0.04	–0.04	0.16**	–0.12	0.12*	–0.08	0.18**	0.21**	–			
18. Family patient justice	–0.15*	–0.26***	–0.05	0.01	0.04	–0.05	0.14*	0.08	–0.01	0.07	0.16**	–0.15*	0.15*	–0.06	0.14*	0.26***	0.76***	–		
19. Distributive justice	–0.37***	–0.38***	–0.02	0.06	0.05	0.27***	0.10	0.05	0.07	0.05	0.16*	–0.48***	–0.20**	–0.10	0.01	0.03	0.05	0.08	–	
20. Procedural justice	–0.41***	–0.49***	–0.13*	–0.06	–0.04	0.21***	0.05	0.07	0.04	0.05	0.19**	–0.42***	–0.12*	–0.10	0.13*	0.20**	0.10	0.14*	0.45***	–
21. Professional identification	–0.13*	–0.45***	0.02	0.06	0.01	0.01	0.04	–0.10	–0.01	–0.02	0.05	–0.09	0.08	0.02	0.32***	0.27***	0.15*	0.13*	0.13*	0.14*

For all measures, scores were computed by averaging across items, with higher scores indicating stronger endorsement of the construct. For sex, 1 indicates "male" and 2 "female." \* $p < 0.05$ ; \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .



seven items, with three items for the affective dimension (e.g., “After being with a friend who is sad about something, I usually feel sad,” physicians  $\alpha = 0.78$ ; nurses  $\alpha = 0.80$ ) and four items for the cognitive dimension (e.g., “I can often understand how people are feeling even before they tell me,” physicians  $\alpha = 0.81$ ; nurses  $\alpha = 0.69$ ). The items were answered on a five-point response scale: 1 = “totally disagree” to 5 = “totally agree.”

### Workload

Workload was evaluated with one item taken from The Areas of Worklife Scale (AWS) (“I have enough time to do what’s important in my job”—recoded) (Leiter and Maslach, 2003), on a five-point response scale: 1 = “totally disagree” to 5 = “totally agree.”

### Control Variables

Income was measured with an item adapted from the European Social Survey (2018): “Which of the following descriptions is closest to your current income?” with a four statements response scale, 1 = “It is very difficult to live with my current income”; 2 = “It is difficult to live on my current income”; 3 = “My current income is enough to live”; 4 = “My current income allows me to live comfortably.”

Religiosity was measured with an item adapted from the European Social Survey (2018): “Regardless of whether you belong to a particular religion, how religious would you say you are?” with a five-points answer scale ranging from 1 “not religious at all” to 5 “very religious.”

Political Orientation was measured with an item adapted from the European Social Survey (2018). (“In politics people sometimes talk of ‘left’ and ‘right.’ Where would you place yourself on this scale, where 1 means the left and 5 means the right?”).

Three items referring to specific factors related to COVID-19 Pandemic were used. Trust in policies to combat the COVID-19: “To what extent do you consider that the measures to deal with this pandemic in your country are adequate?” from 1 “nothing” to 5 “very much”; task changes: “Has the COVID-19 pandemic changed your functions?” Yes/No answer; and isolation from family: “Are you isolated from your nuclear family due to COVID-19?” Yes/No answer).

## RESULTS

### Preliminary Analysis

The descriptive statistics for all variables are given in **Tables 1, 2**. Physicians ( $M = 3.07$ ,  $SD = 0.65$ ) and nurses ( $M = 3.10$ ,  $SD = 0.60$ ) had significantly higher levels of exhaustion than disengagement ( $M = 2.69$ ,  $SD = 0.71$ , for physicians;  $M = 2.76$ ,  $SD = 0.70$ , for nurses), [physicians  $t(228) = 9.28$ ,  $p < 0.001$ ; nurses  $t(267) = 8.41$ ,  $p < 0.001$ ].

First, we examined the pattern of correlations between the variables under study separately for physicians and nurses. **Table 4** (physicians) and **Table 5** (nurses) depict correlations between study variables.

For physicians, significant negative correlation for exhaustion and disengagement were found with the following variables: income, trust in policies (COVID-19), justice of colleagues, distributive justice, procedural justice, and professional identification. A positive significant association between workload and exhaustion and disengagement was obtained. Cognitive empathy, meaningful work, patient justice, and family patient justice were significantly and negatively correlated with disengagement. Being a man was a risk factor for disengagement.

For nurses, we found a negative significant correlations for both exhaustion and disengagement with income, trust in policies (COVID-19), meaningful work, justice of colleagues, patient justice, family patient justice, distributive justice, procedural justice, and professional identification. Furthermore, exhaustion was positively associated with affective empathy, and negatively associated with age, years of professional experience and task changes (COVID-19). A significant negative association between disengagement and religion was obtained. Being a woman was a risk factor for exhaustion. A positive association was also found between both exhaustion and disengagement with workload.

### Main Analysis

To clarify the relationships between our variables, multiple regression analyses were performed for each burnout dimension (exhaustion and disengagement) regarding each professional group. The variables were ordered in two blocks: control variables—Step 1 = sex, years of professional experience<sup>2</sup>, income, religiosity, political orientation, isolated from family, task changes, trust in policies to deal with COVID-19; and theoretical predictors—Step 2 = workload, cognitive empathy, affective empathy, meaningful work, justice of colleagues, patient and family patient’s justice, distributive justice, procedural justice, professional identification.

Therefore, we will study the explanatory power of theoretical predictors of exhaustion and disengagement in addition to that of control variables. For both subsamples, the results of Model 2 is presented in **Table 6**.

In physicians, 36% of the variance in exhaustion was predicted by workload (beta = 0.24;  $p < 0.001$ ), affective empathy (beta = 0.12;  $p < 0.05$ ), procedural justice (beta =  $-0.30$ ;  $p < 0.001$ ) and by professional identification (beta =  $-0.22$ ;  $p < 0.001$ ). Higher workload and affective empathy significantly predicted higher exhaustion. Higher procedural justice and professional identification significantly predicted lower exhaustion.

For nurses, 42% percent of the variance in exhaustion was predicted by years of professional experience (beta =  $-0.12$ ;  $p < 0.05$ ), income (beta =  $-0.16$ ;  $p < 0.01$ ), trust in policies (COVID-19) (beta =  $-0.13$ ;  $p < 0.05$ ), workload (beta = 0.31;  $p < 0.001$ ), affective empathy (beta = 0.15;  $p < 0.01$ ) and procedural justice (beta =  $-0.15$ ;  $p < 0.05$ ). Higher workload and affective empathy significantly predicted higher exhaustion. Age, higher income, higher trust in policies (COVID-19) and higher procedural justice significantly predicted lower exhaustion.

<sup>2</sup>We did not include age in the regression to avoid multicollinearity issues due to its’ high correlation with years of professional experience.

For physicians, 42% of the variance in disengagement was predicted by sex ( $\beta = -0.15$ ;  $p < 0.01$ ), procedural justice ( $\beta = -0.39$ ;  $p < 0.001$ ) and professional identification ( $\beta = -0.31$ ;  $p < 0.001$ ). Being a male, a perception of higher procedural justice and professional identification significantly predicted lower disengagement.

Finally, 52% of the variance in disengagement in nurses was predicted by income ( $\beta = -0.10$ ;  $p < 0.05$ ), religiosity ( $\beta = -0.10$ ;  $p < 0.05$ ), workload ( $\beta = 0.11$ ;  $p < 0.05$ ), meaningful work ( $\beta = -0.15$ ;  $p < 0.01$ ), justice of colleagues ( $\beta = -0.10$ ;  $p < 0.05$ ), patient and family patient's justice ( $\beta = -0.12$ ,  $p < 0.05$ ), distributive justice ( $\beta = -0.12$ ;  $p < 0.05$ ), procedural justice ( $\beta = -0.27$ ;  $p < 0.001$ ) and professional identification ( $\beta = -0.28$ ;  $p < 0.001$ ). High income, religiosity, meaningful work, justice of colleagues, patient and family patient's justice, distributive justice, procedural justice, and professional identification significantly predicted lower disengagement. Higher workload significantly predicted higher disengagement.

Given the results consistently found the unique impact of procedural justice and professional identification as burnout protectors (except for exhaustion in nurses), and workload as a core risk factor (except for disengagement in physicians), we tested three possible models of the relation between these variables. We used Hayes's (2013) Multiple Mediation macro

(5,000 iterations; bias corrected) and we included the significant predictors found in the regression analysis (Table 6) as covariates.

Based on the group-value model, we first tested the possible indirect effect of procedural justice on exhaustion through professional identification in physicians and disengagement (both for physicians and nurses). None of the indirect effects of procedural justice on burnout through professional identification was significant (exhaustion in physicians:  $\beta = -0.02$ , CI 95% [-0.06, 0.00]; disengagement in physicians  $\beta = -0.04$ , CI 95% [-0.09, 0.00]; disengagement in nurses,  $\beta = -0.01$ , CI 95% [-0.05, 0.03].

We also tested a model where professional identification has an indirect effect on burnout through workload (Avanzi et al., 2018). None of the indirect effects of professional identification on burnout through workload were significant (exhaustion in physicians:  $\beta = -0.01$ , CI 95% [-0.03, 0.04]; exhaustion in nurses:  $\beta = -0.03$ , CI 95% [-0.09, 0.02]; disengagement in physicians  $\beta = 0.00$ , CI 95% [-0.01, 0.03]; disengagement in nurses,  $\beta = 0.00$ , CI 95% [-0.01, 0.02].

Finally, we tested the possibility of procedural justice buffering the impact of workload on burnout. The buffer effect of procedural justice on the relation between workload and burnout was only obtained for disengagement in nurses ( $\beta = -0.11$ , CI 95% [-0.18, -0.03]). In this sample, when procedural justice was lower, higher workload is significantly associated with

**TABLE 6 |** Regressions: predicting burnout in physicians ( $N = 229$ ) and nurses ( $N = 268$ ).

	Exhaustion						Disengagement					
	Physicians			Nurses			Physicians			Nurses		
	B	SEB	$\beta$	B	SEB	$\beta$	B	SEB	$\beta$	B	SEB	$\beta$
<b>Step 1—Controlling variables</b>												
Sex	0.06	0.08	0.04	0.09	0.07	0.06	-0.22	0.08	-0.15**	-0.13	0.07	-0.08
years of professional experience	-0.00	0.00	-0.03	-0.01	0.00	-0.12*	-0.00	0.00	-0.06	-0.00	0.00	-0.03
Income	-0.08	0.06	-0.09	-0.14	0.05	-0.16**	-0.04	0.06	-0.04	-0.11	0.05	-0.10*
Religiosity	0.04	0.03	0.07	0.02	0.03	0.03	0.01	0.04	0.02	-0.06	0.03	-0.10*
Political orientation	-0.06	0.04	-0.07	0.01	0.04	0.02	0.07	0.05	0.09	0.03	0.04	0.03
Isolated from family (COVID-19)	0.00	0.08	0.00	-0.05	0.06	-0.04	0.04	0.08	0.03	-0.02	0.07	-0.01
Task changes (COVID-19)	-0.05	0.10	-0.03	-0.01	0.06	-0.01	-0.13	0.10	-0.07	-0.08	0.07	-0.05
Trust in policies (COVID-19)	-0.09	0.05	-0.10	-0.11	0.04	-0.13*	-0.08	0.06	-0.08	-0.02	0.05	-0.02
<b>Step 2—Theoretical predictors</b>												
Workload	0.15	0.04	0.24***	0.19	0.04	0.31***	0.06	0.04	0.09	0.08	0.04	0.11***
Cognitive empathy	0.02	0.09	0.01	0.08	0.09	0.05	0.02	0.10	0.01	-0.03	0.10	-0.01
Affective empathy	0.10	0.05	0.12*	0.11	0.04	0.15**	0.08	0.05	0.08	0.02	0.04	0.02
Meaningful work	0.08	0.07	0.07	-0.09	0.06	-0.08	-0.08	0.08	-0.06	-0.19	0.06	-0.15***
Justice of colleagues	-0.02	0.06	-0.02	-0.02	0.06	-0.02	-0.05	0.07	-0.05	-0.12	0.06	-0.10*
Patient and family patient's justice	-0.01	0.06	-0.01	-0.03	0.05	-0.04	-0.09	0.07	-0.08	-0.13	0.05	-0.12***
Distributive justice	-0.05	0.05	-0.07	-0.05	0.05	-0.06	0.01	0.05	0.02	-0.11	0.05	-0.12*
Procedural justice	-0.22	0.05	-0.30***	-0.11	0.05	-0.15*	-0.32	0.05	-0.39***	-0.23	0.05	-0.27***
Professional identification	-0.22	0.06	-0.22***	-0.03	0.05	-0.03	-0.35	0.06	-0.31***	-0.29	0.05	-0.28***
Constant	4.81	0.73		3.96	0.66		6.76	0.77		7.67	0.70	
R <sup>2</sup>		0.36			0.42			0.42			0.52	
R <sup>2</sup> adjusted		0.31			0.38			0.37			0.49	
R <sup>2</sup> change		0.26***			0.22***			0.33***			0.40***	

B, Unstandardized coefficients;  $\beta$ , Unstandardized coefficients. R<sup>2</sup> corresponds to Step 2; R<sup>2</sup> change between Step 1 and Step 2. For all measures, scores were computed by averaging across items, with higher scores indicating stronger endorsement of the construct. For sex, 1 indicates "male" and 2 "female." \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

higher disengagement (beta = 0.16, CI<sub>95%</sub> [0.07, 0.26]), but when procedural justice was higher, workload did not affect disengagement (beta = -0.01, CI<sub>95%</sub> [-0.10, 0.08]).

For physicians we did not obtain support for the buffer effect of procedural justice on workload, neither for exhaustion (beta = -0.02, CI<sub>95%</sub> [-0.10, 0.05]), nor for disengagement (beta = -0.09, CI<sub>95%</sub> [-0.18, 0.00]).

## DISCUSSION

This paper aimed to test and compare the unique and predictive impact of workload, empathy, meaningful work, perceptions of justice, and professional identification on burnout (exhaustion and disengagement) of physicians and nurses in times of COVID-19 pandemic. These variables have been shown to be important predictors of burnout, but have not been considered together in a same study. Furthermore, we also controlled for individual variables, that could impact on that relations: demographic, ideological, and related with COVID-19 pandemic.

The results of correlations generally confirmed the ones of previous research. However, the testing and comparison of the unique impact of each of these variables revealed that the predictors considered are not equally important. We obtained a pattern of results that shows some predictors are common to both dimensions of burnout both in physicians and nurses, and a specificity of some of the predictors for each of the dimensions of burnout and that differ between physicians and nurses.

Workload was positively associated with both dimensions of burnout both in physicians and nurses (e.g., West et al., 2018; Dubale et al., 2019), and even when all variables were considered, workload remained a significant risk factor except for disengagement in physicians.

Justice perceptions were found to be differently associated with burnout, all of them as protective factors when significant. Procedural justice, distributive justice and justice of colleagues were negatively associated with both dimensions of burnout both in physicians and nurses. Justice of patients and family patient justice were negatively associated with exhaustion (nurses) and disengagement (physicians and nurses). These results confirm the research previously conducted by Moliner et al. (2005) demonstrating the protective role of justice in burnout. Furthermore, procedural justice was a unique and significant protector for the two dimensions of burnout in physicians and nurses. This is in line with the research that shows the importance of procedural justice for good functioning in organizations and well-being (e.g., Elovainio et al., 2002a).

Professional identification was correlated negatively with both dimensions of burnout both in physicians and nurses. These results support the hypothesis of professional identification as protective factor of burnout, as demonstrated in the study by Avanzi et al. (2018), and it remained a significant and unique protective factor for distancing (both in physicians and nurses) and for exhaustion in physicians, but not for exhaustion in nurses, confirming the important role of social identity for the protection against burnout.

For the disengagement of nurses, more dimensions of justice besides the procedural one remained significant protective factors when all variables were considered, namely distributive justice, justice of colleagues, and patient and family patient's justice.

Meaningful work was negatively associated with exhaustion (nurses) and disengagement (physicians and nurses). These results support our hypothesis and confirm previous research on the premise of meaningful work as protective factor for burnout (e.g., Borritz et al., 2005) in physicians (e.g., Rasmussen et al., 2015) and nurses (e.g., Tei et al., 2014). However meaningful work only remained a significant predictor of disengagement in nurses.

For empathy the results support the hypothesis of empathy as risk factor, specifically affective empathy for exhaustion in nurses, and cognitive empathy as protective factor for disengagement in physicians. When all the variables were considered, affective empathy emerged as risk factor for exhaustion, both in physicians and nurses.

Income was a risk factor for both dimensions of burnout in nurses, which might be explained by the lower incomes of nurses in Portugal and by the fact that, for people with lower incomes, income is more strongly related with well-being than for people with higher incomes (Lucas and Schimmack, 2009). Indeed, income is a resource that helps individuals to overcome inconveniences and hassles, that allow individuals to obtain paid help for less enjoyable activities, such as chores, and also to engage in enjoyable activities (for a review, see Tay et al., 2017). Future studies should try to further investigate these associations.

Given the results consistently found the unique impact of procedural justice and professional identification as burnout protectors (except for exhaustion in nurses), and workload as a core risk factor (except for disengagement in physicians) we tested three possible models of the relation between these variables.

The first analysis was based on the group-value model. We tested the possible indirect effect of procedural justice on burnout through professional identification. However, our data did not support for the application of the group-value model to predict burnout in the present sample of physicians and nurses.

The second analysis was based on the model where professional identification has an indirect effect on burnout through workload (Avanzi et al., 2018). Again, our data did not support for the this model.

The third analysis, tested the possibility that procedural justice could act as a buffer and be a moderator of the impact of workload on burnout. Only for disengagement in nurses it was found that high procedural justice may decrease the impact of workload on burnout.

This study has important implications for interventions because it suggests several focus that might be simultaneously and independently addressed: decreasing workload and promoting procedural justice and professional identification, seem to be central to interventions for reducing the risk of burnout or preventing it from occurring in the first place. The fact that these factors are related with organizational issues goes in the same line that burnout intervention may be done at the level of the working conditions (Maslach and Leiter, 2015) and not mainly at the level

of the treatment of the individual (Maslach et al., 2001) as it still happens (e.g., Hue and Lau, 2015; Castanheira, 2020).

This study has of course some limitations. Some of the constructs were assessed with few items, because we had many variables and the measurement of all of them with the entire scales would result in a very long questionnaire that would certainly discourage participants from answering. However, the measures of internal consistency of the shortened scales were very good.

A second limitation is related with the samples, that were convenience samples and the data were collected in a specific period of the pandemic. Nevertheless, the sample showed good variability in most of the sociodemographic, ideological and occupational variables, which supports its' heterogeneity and therefore the possibility of generalizability of these results for similar samples.

One third limitation refers to the correlational design of this study, that limits the nature of the conclusions that can be drawn about the causal relations among variables. Nevertheless, considering psychosocial variables as predictors and burnout as an outcome is in line with previous research that tried to find the predictors of burnout (e.g., Demerouti et al., 2001).

A fourth limitation refers to the fact that all predictors and outcome variables were self-reported, which might lead to possible overestimation of the associations between them due to shared method variance.

Future studies should try to replicate these results with other samples of physicians and nurses and may also explore if the protective factors that we found in this study extend to other occupations in contexts and times less affected by the specificities of adapting to a Pandemic.

We strongly believe that this paper can contribute to encourage research to focus on the variables that are the stronger predictors of burnout and to stimulate the test of models that consider how these variables might relate. According to our results, the core variables seem to be procedural justice, professional identification and workload, and act independently of each other. With the continuation of the pandemic and the persistence of the increased stress on the health care systems, we recommend that procedural justice and professional identification should receive special attention of interventions in the Health Care Services. However, we do not intend to devalue the importance of recommending the reduction of the workload to which these professionals are subject to. We think the study

of protective factors is important, but they should not devalue the relevance and responsibility of organizations to reduce risk factors, namely workload.

## DATA AVAILABILITY STATEMENT

The datasets presented in this article are not publicly available because the participants of this study did not agree for their data to be shared publicly. However, the datasets can be available under request directed to Isabel.correia@iscte-iul.pt.

## ETHICS STATEMENT

This study received Ethical approval by the Portuguese Order of Psychologists (OPP – Ordem dos Psicólogos Portugueses), in the framework of an initiative to support scientific research in health psychology and behavior change (Via Verde de Apoio OPP para a Investigação Científica em Saúde Psicológica e Mudança Comportamental). The participants provided their electronic informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

IC planned the study and selected the variables and the instruments. IC and AA contributed to the writing of all parts of the manuscript. AA put up the questionnaire in the Qualtrics platform and recruited the participants via Facebook and LinkedIn. Both authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Burnout Syndrome Among Hospital Healthcare Workers During the COVID-19 Pandemic and Civil War: A Cross-Sectional Study

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**Objective:** We aimed to determine the prevalence of burnout among hospital healthcare workers in Libya during the coronavirus disease (COVID-19) pandemic and civil war.

**Methods:** A cross-sectional study was conducted from April 18 to May 2, 2020 among Libyan healthcare workers. Data on participant characteristics were collected with a specifically designed questionnaire. Burnout was assessed with the abbreviated Maslach Burnout Inventory (aMBI) comprising three subscales: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA), with each sub-scale score range from 0 to 18. For EE and DP, scores of 10 to 18 were regarded as “moderate to severe burnout.” PA was scored inversely, where a score  $\leq 10$  indicated severe burnout.

**Results:** The study yielded a sample size of 532 participants. Of these, 357 (67.1%) reported emotional exhaustion (EE Score  $\geq 10$ ), 252 (47.4%) reported depersonalization (DP score  $\geq 10$ ), and 121 (22.7%) reported a lower sense of personal accomplishment (PA score  $\leq 10$ ). Verbal abuse was experienced by 304 participants (57.1%) and physical abuse in 93 (17.5). Gender was associated with high emotional exhaustion and high depersonalization. Being 35 years or older was associated with high depersonalization. Professional specialty was significantly associated with high emotional exhaustion and depersonalization. Fear of COVID-19 infection was associated with high emotional exhaustion and high depersonalization.

**Conclusion:** The rising prevalence of mental disorders and inadequate availability of health services facilities during the COVID-19 pandemic and civil war demonstrated the need for healthcare policies to address the well-being of healthcare workers to decrease the risk of loss, suicide, and medical negligence.

**Keywords:** coronavirus disease, medical staff, professional burnout, COVID-19, psychiatric illness, pandemic, war exposure

## INTRODUCTION

In December 2019, a novel coronavirus designated as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified as the cause of severe viral pneumonia in Wuhan, a city in Hubei Province, China (1). This virus was recognized as a global pandemic on February 11, 2020 (2). By August 14, the World Health Organization recorded over twenty million cases of coronavirus disease (COVID-19), including more than 756,000 deaths (3, 4).

Since the emergency of the first case of COVID-19 was detected in Libya on March 24, followed by a substantial increase in the number of cases. By August 14, more than 6,611 cases were confirmed, with the death toll exceeding 132 (5).

Research indicates that frontline healthcare staff involved in the management and diagnosis of COVID-19 are at risk of experiencing psychiatric disturbances and deteriorating mental health (6). This may be a result of various challenges, such as shortages of personal protective equipment, scarcity of appropriate medications, risk of infecting family members, expectations of inadequate assistance, and fear of contracting the virus. Along with the financial difficulties that physicians are facing in many countries, these factors place healthcare workers under considerable pressure, threatening their mental well-being (7, 8).

Several studies have identified a correlation between mental health issues and the COVID-19 pandemic in healthcare workers. A recent study conducted in China from January 29, 2020, to February 3, 2020, to assessed the mental health status of physicians and nurses, and found that they demonstrated a high prevalence of anxiety, depression, and insomnia (6). Further, a study conducted in Singapore from February 19, 2020, to March 13, 2020, observed increased psychological distress, anxiety, and depression among healthcare workers during COVID-19 (9).

However, there is little data available on physician burnout during the pandemic. Burnout is defined as a medical condition of physical and mental fatigue associated with work or care-providing activities (10, 11). Burnout involves cognitive fatigue, depersonalization, and a diminished sense of success (12). Since physicians endure an extremely taxing working environment, burnout syndrome among healthcare workers has attracted major interest in recent years.

Research supports that physicians are at higher risk of burnout due to exposure to emotional pressure beyond the level experienced in most other professions (13). Furthermore, burnout has been linked to decreased efficiency and diminished work satisfaction among physicians (14). Subsequently, irritability and dissatisfaction may impact individual's sense of well-being and willingness to function fully at work, negatively affecting the ability of physicians to care for patients (15). In addition, physician burnout has been linked to increased risk of medical errors, which also has a harmful effect on patient outcomes (16). Worryingly, burnout has been associated with suicidal risk and elevated levels of depression (17–20). The condition has also been linked to physiological issues, such as increased risk of cardiovascular diseases (21, 22), and inflammation biomarker elevation (23).

A further exacerbating factor for Libyan physicians is that since 2011, Libya has suffered from several civil wars and financial crises that can potentially lead to conflict-related traumatic events and higher rates of mental disorders (24, 25). In addition, due to the absence of a formal psychiatric training program, Libya lacks adequate mental healthcare facilities; currently having 0.2 psychiatrists and 0.05 psychiatric nurses per 100,000 people (26, 27).

Therefore, we believe that healthcare workers in Libya are at greater risk for burnout syndrome and lower quality of life during the COVID-19 pandemic. We aimed to determine the prevalence of, and factors associated with, burnout syndrome among Libyan healthcare workers during the COVID-19 pandemic in a time of civil war.

## METHODS

This was a cross-sectional study.

### Participants

Healthcare professionals working in Libyan hospitals were recruited for the study from April 18, 2020, to May 2, 2020. Data were collected via a questionnaire that was distributed among 20 major hospitals in printed and electronic format, via mobile messages and emails. Inclusion criteria were as follows: participants must have worked in late March and April, and must have worked in either surgery, internal medicine, intensive care, or emergency departments. Exclusion criteria were as follows: having patients with mental illnesses or severe chronic diseases such as advanced diabetes, hypertension, and tuberculosis. Participants with missing data, incomplete Abbreviated Maslach Burnout Inventory (aMBI), or those with a history of mental illness were excluded from the analysis.

### Measures

The questionnaire contained two sections. The first section was developed specifically for the study and comprised participant demographic characteristics, marital status, years of work experience, work shifts, number of working hours per week, illicit drug use and smoking history, employment status, educational level, perspectives on COVID-19, social stigmatization, the effects of the civil war, internal displacement, transportation-related issues, physical and verbal abuse of physicians.

The second section contained the English version of the Abbreviated Maslach Burnout Inventory (aMBI), which is a nine-item scale developed for and most commonly used in the detection of burnout among physicians (28–31). The aMBI comprises three subscales: emotional exhaustion (EE, emotional depletion due to job demand and continuous work-related stress), depersonalization (DP, impersonal response toward the recipient service), and personal accomplishment (PA, the degree of personal competence, achievement, and job satisfaction). Each subscale contains three items. Responses are based on a seven-point Likert scale, ranging from 0 (“never”) to 6 (“every day”). For EE and DP, a higher score indicates greater burnout, and for PA, a higher score indicates a greater sense of accomplishment. Therefore, high EE and DP scores, and a low PA score indicated



**TABLE 1** | Baseline characteristics of study participants ( $n = 532$ ).

Variables	Total (%) $n = 532$	Women(%) $n = 238$	Men (%) $n = 294$	Phi ( $\phi$ )/Cramer's V	P-value
Age range				0.07	0.087
<35	392 (73.7)	184 (77.3)	208 (70.7)		
$\geq 35$	140 (26.3)	54 (22.7)	86 (29.3)		
Marital status				0.09	0.038*
Married	223 (41.9)	88 (37)	135 (45.9)		
Not married (single, divorced, widow)	309 (58.1)	150 (63)	159 (54.1)		
Living arrangements				0.09	0.038*
With family	348 (65.4)	167 (70.2)	181 (61.6)		
Alone	184 (34.6)	71 (29.8)	113 (38.4)		
Employment status				0.28	<0.001**
Governmental sector	244 (45.9)	143 (60.1)	101 (34.4)		
Private sector	65 (12.2)	30 (12.6)	35 (11.9)		
Both	223 (41.9)	65 (27.3)	158 (53.7)		
Years of experience				0.14	0.019*
<3 years	231 (43.4)	114 (47.9)	117 (39.8)		
3–5 years	111 (20.9)	53 (22.3)	58 (19.7)		
5–15	143 (26.9)	48 (20.2)	95 (32.3)		
> 15 years	47 (8.8)	23 (9.7)	24 (8.2)		
Department				0.34	<0.001**
Internal Medicine Departments	223 (41.9)	134 (56.3)	89 (30.3)		
Surgical Departments	134 (25.2)	25 (10.5)	109 (37.1)		
Emergency Medicine	111 (20.9)	54 (22.7)	57 (19.4)		
Intensive Care Units	64 (12)	25 (10.5)	39 (13.3)		
Smoking				0.4	<0.001**
Yes	96 (18)	2 (0.8)	94 (32)		
No	436 (82)	236 (99.2)	200 (68)		
Illicit drugs use				0.04	0.322
Yes	18 (3.4)	6 (2.5)	12 (4.1)		
No	514 (96.6)	232 (97.5)	282 (95.9)		
Stigmatization due to COVID-19				0.08	0.052
Yes	169 (31.8)	86 (36.1)	83 (28.2)		
No	363 (68.2)	152 (63.9)	211 (71.8)		
Internal displacement				0.003	0.941
Yes	173 (32.5)	77 (32.4)	96 (32.7)		
No	359 (67.5)	161 (67.6)	198 (67.3)		
Living in conflict area				0.05	0.246
Yes	176 (33.1)	85 (35.7)	91 (31)		
No	356 (66.9)	153 (64.3)	203 (69)		
Verbal abuse				0.02	0.725
Yes	304 (57.1)	134 (56.3)	170 (57.8)		
No	228 (42.9)	104 (43.7)	124 (42.2)		
Physical abuse				0.13	0.004*
Yes	93 (17.5)	29 (12.2)	64 (21.8)		
No	439 (82.5)	209 (87.8)	230 (78.2)		
Working hours per week, (mean $\pm$ SD)	53.26 $\pm$ 11.19	49.98 $\pm$ 8.93	55.91 $\pm$ 12.1		<0.001**
Number of shifts per month, mean $\pm$ SD	3.66 $\pm$ 0.71	3.52 $\pm$ 0.73	3.78 $\pm$ 0.67		<0.001**

SD, standard deviation.

\*Significant at ( $p < 0.05$ ); \*\*Significant at ( $p < 0.001$ ).

**TABLE 2** | Parameter and standard error estimates for the model of **Figure 1A**.

Model Parameters	Standardized estimate	Unstandardized estimate	Standard error	p-value
<b>Loadings/effects on aMBI</b>				
I feel emotionally drained from my work	0.77	1.00 <sup>a</sup>		
I feel fatigued when I get up in the morning and have to face another day on the job	0.73	0.91	0.05	<0.001**
Working with people all day is really a strain for me	0.68	0.91	0.06	<0.001**
I feel I treat some patients as if they were impersonal objects	0.57	1.00 <sup>a</sup>		
I've become more callous toward people since I took this job	0.78	1.33	0.11	<0.001**
I don't really care what happens to some patients	0.54	0.91	0.09	<0.001**
I deal very effectively with the problems of my patients	0.38	1.00 <sup>a</sup>		
I feel I'm positively influencing other people's lives through my work	0.55	1.68	0.29	<0.001**
I feel exhilarated after working closely with my patients	0.56	1.89	0.32	<0.001**
<b>Covariances</b>				
Emotional exhaustion <-> depersonalization	1.76		0.18	<0.001**
Depersonalization <-> personal accomplishment	0.43		0.08	<0.001**
Emotional exhaustion <-> personal accomplishment	0.54		0.09	<0.001**

<sup>a</sup>"a" mean for the **Figure 1A**. \*\*Significant at ( $p < 0.001$ ).

a higher level of burnout. Overall burnout was taken as the sum of EE and DP scores.

The scores of each subscale ranged from 0 to 18. For EE and DP, scores of 0 to 9 were categorized as “no to low burnout” and scores of 10 to 18 were regarded as “moderate to severe burnout.” This was the inverse for PA because higher PA scores indicate less burnout. For PA, a score  $\leq 10$  indicates severe burnout. The score for each item was summed for each physician.

The aMBI is a reliable tool to measure burnout among physicians and has been validated in several previous studies (32–37). The Cronbach's alpha coefficient scores for each subscale were as follows: emotional exhaustion  $\alpha = 0.89$ , depersonalization  $\alpha = 0.76$ , personal accomplishment  $\alpha = 0.72$ , and overall burnout  $\alpha = 0.81$ .

## Statistical Analysis

Data did not follow normal distribution according to Shapiro-Wilk test. Confirmatory factor analysis of the Abbreviated Maslach Burnout Inventory (aMBI) was assessed using structural equation modeling (SEM) as previously published (38), and the models were tested using IBM<sup>®</sup> SPSS<sup>®</sup> Amos<sup>™</sup> 24 (IBM Corp., Armonk, NY, USA). This yielded several measures as follows:  $\chi^2$  minimum fit test as in inferential testing of the model. The root means square error of approximation (RMSEA) determine the lack of fit due to reliability (39), where it provides fit per degree of freedom of the model with 0.05 or less desirable as indicating good fit model. Adjusted goodness of fit index (AGFI) and the goodness of fit index (GFI) adjust for the number of estimated with a range from 0 to 1 with 0.9 or more as a desirable indicator of good fitting model. Also, comparative fit index (CFI) will be used to assess fit related to null modeling using noncentrality parameters (40). CFI range from 0 to 1 with 0.9 or more as an indicator of good fitting model. The standardized root mean square residual (RMR) was used as the average of the differences between sample correlations and

estimated population correlations, with a value range from 0 to 1; where  $<0.08$  indicative of fitting model (41).

Differential item functioning (DIF) using multiple indicator multiple cause (MIMIC) model was performed on latent factors (EE, DP, PA) of the best fitting model on the “online vs. paper” variable to see if there were statistically significant coefficients between the two methods of data collection which may necessitate splitting of the samples or whether both ways yield similar valid results.

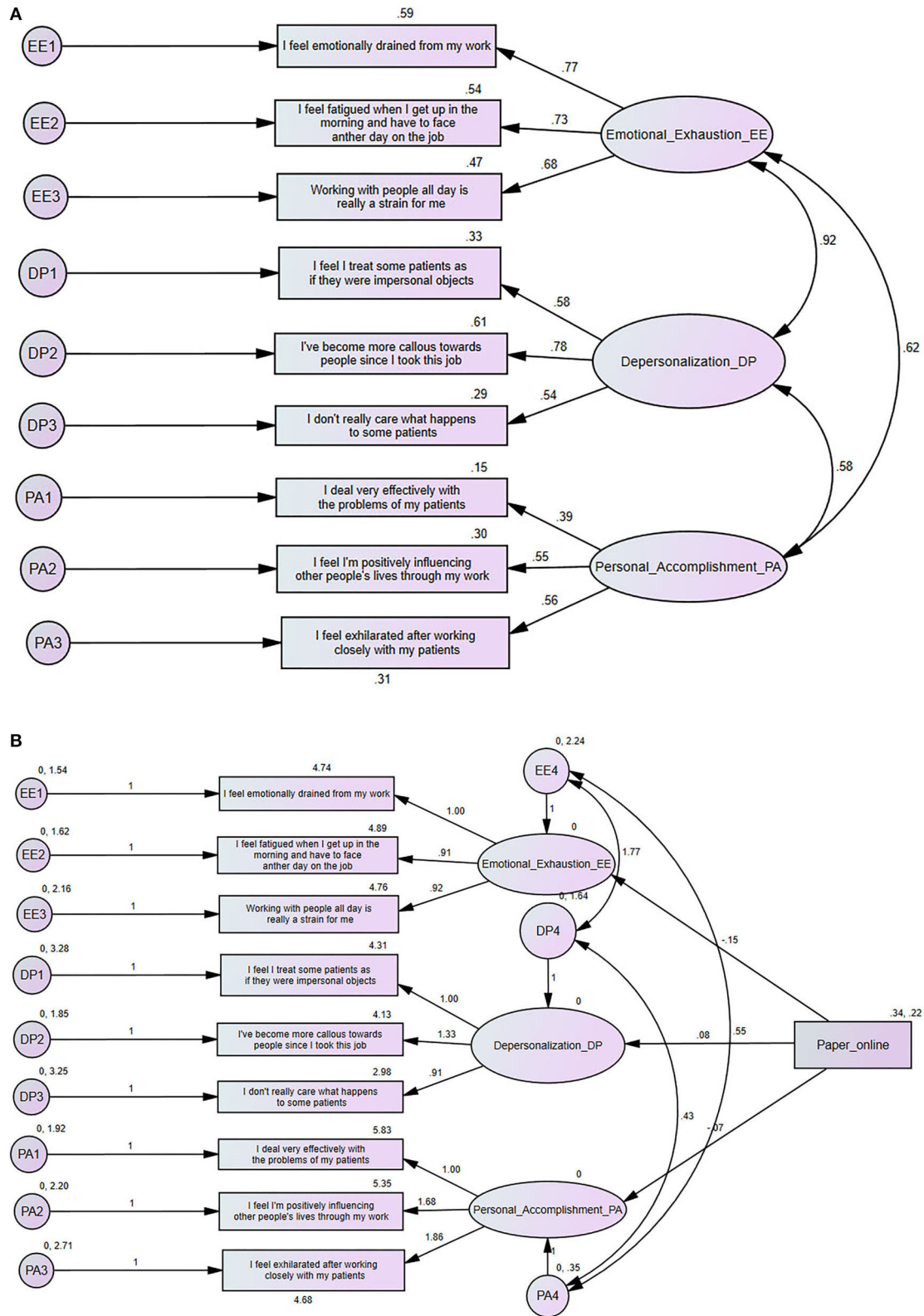
Baseline characteristics and working conditions for men and women were compared using the Mann-Whitney U test for continuous variables and the chi-square test for categorical variables. Fisher's exact test was used to compare the burnout subscales with the demographic data. Phi ( $\phi$ ) was used to measure the strength of association of two dichotomous variables, while Cramer's V was used to measure the strength or association of more than two nominal variables. The aMBI level of internal consistency was determined by a Cronbach's alpha among study participants. A Spearman's rank-order correlation test was conducted to assess the relationship between emotional exhaustion, depersonalization, and personal accomplishment scores and study variables. Data entry and statistical analysis was performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA).

## Ethical Considerations

The study was approved by the Bioethics Committee at the Biotechnology Research Center in Libya. All participants provided consent before participating in the study.

## RESULTS

A total of 532 out of 600 (88.66%) participants completed the questionnaires [353 (66.4%) online, 179 (33.6%) papers]. The mean age was 33.08 (SD = 7.25). The sample comprised 294 (55.3%) males and 238 (44.7%) females. Participants with



**FIGURE 1 | (A)** Standardized parameter estimates for the factor structure of the Abbreviated Maslach Burnout Inventory (aMBI). **(B)** Multiple indicator multiple cause (MIMIC) structural equation model for differential item functioning (DIF) based on paper or online method.

**TABLE 3** | Scores of participants according to the abbreviated Maslach Burnout Inventory.

Subscale	Mean $\pm$ SD	Range (min–max)	Percentile		
			25th	50th	75th
Emotional exhaustion	11.25 $\pm$ 4.81	0–18	8	12	15
Depersonalization	8.5 $\pm$ 5.06	0–18	4.25	9	12.75
Decreased personal accomplishment	12.74 $\pm$ 3.74	0–18	11	13.5	15
Emotional exhaustion + depersonalization	19.76 $\pm$ 8.99	0–36	12	21	27

SD, standard deviation.

incomplete questionnaire data were excluded from the analysis. Only responses from internal medicine (223; 41.9%), intensive care (64; 12%), emergency medicine (111; 20.9%), and surgical departments (134; 25.2%), and their subspecialties were included. The participants' baseline characteristics are presented in **Table 1**. A chi-square test for association was conducted between gender and subjects' basic characteristics. There was a statistically significant association between gender and marital status, living conditions, employment status, years of work experience, department, smoking, and physical abuse ( $p < 0.05$ ). We used the validated English version of aMBI, and the scale was tested for internal consistency, as determined by a Cronbach's alpha of 0.76 for emotional exhaustion,  $\alpha = 0.66$  for depersonalization,  $\alpha = 0.71$  for personal accomplishment, and overall burnout  $\alpha = 0.801$ .

### Confirmatory Factor Analysis

CFA was performed on aMBI items, and parameters were calculated by using maximum likelihood. Minimum was achieved,  $\chi^2 = 170.35$ , degree of freedom (df) = 24,  $p \leq 0.001$ . While (GFI = 0.93, AGFI = 0.87, CFI = 0.88, RMSEA = 0.11, and RMR = 0.22). The results are summarized in **Table 2** and **Figure 1A** provides an overview of the model. Testing measurement invariance was performed between paper and online collection method to see if there is any difference. Overall model, we found  $\chi^2 = 190.82$ , df = 48,  $p < 0.001$ . We found that CMIN/DF was found 3.97, GFI = 0.927, AGFI = 0.86, RMSEA = 0.07, and RMR = 0.25. Chi-square difference test between unconstrained ( $\chi^2 = 190.8$ , df = 48) and constrained ( $\chi^2 = 196.2$ , df = 57) structural models for two groups of data collection model and we found invariant with  $p = 0.79$ . Therefore, groups are not different at model level, however they may be different at the path level. MIMIC model of the latent factors of aMBI burnout scale (EE, DP, and PA) was performed for different methods of data collection (online or paper), we found that none of the latent variables yield statistically significant coefficients, which means that there was no difference between the two methods of data collection as follows: Emotional Exhaustion (Regression Weight Estimate =  $-0.148$ , Standardized Error (S.E.) = 0.156, C.R. =  $-0.949$ ,  $p = 0.343$ ), Depersonalization (Regression Weight Estimate =  $0.077$ , Standardized Error (S.E.) = 0.139, C.R. = 0.553,  $p = 0.580$ ), and Personal accomplishment

(Regression Weight Estimate =  $-0.071$ , Standardized Error (S.E.) = 0.076, C.R. =  $-0.939$ ,  $p = 0.348$ ). **Figure 1B** shows the MIMIC model using paper-online variable as a differential factor.

### Burnout Results Using the Abbreviated Maslach Burnout Inventory

Of the study participants, 357 (67.1%) reported experiencing high emotional exhaustion (EE Score  $\geq 10$ ), while 252 (47.4%) reported experiencing depersonalization (DP score  $\geq 10$ ), and only 121 (22.7%) reported a lower sense of personal accomplishment (PA score  $\leq 10$ ). The mean score of emotional exhaustion was 11.3 (SD = 4.8). For depersonalization, the mean score was 8.5 (SD = 5.1), while for personal accomplishment mean score was 12.7 (SD = 3.7).

**Table 3** presents the scores for the entire scale and its subscales. We found a statistically significant association between emotional exhaustion and gender, years of work experience, department, and living in a conflict area ( $p < 0.05$ ). When we compared depersonalization with study characteristics, we found a statistically significant association between gender, age, department, internal displacement, and verbal abuse ( $p < 0.05$ ). However, for personal accomplishment [Decreased personal accomplishment ( $\leq 10$ ) and Mod-High personal accomplishment ( $> 10$ )], we did not identify a statistically significant association with other study variables. A comprehensive comparison between participants characteristics and subscales of burnout can be found in **Supplementary Material**.

#### Emotional Exhaustion

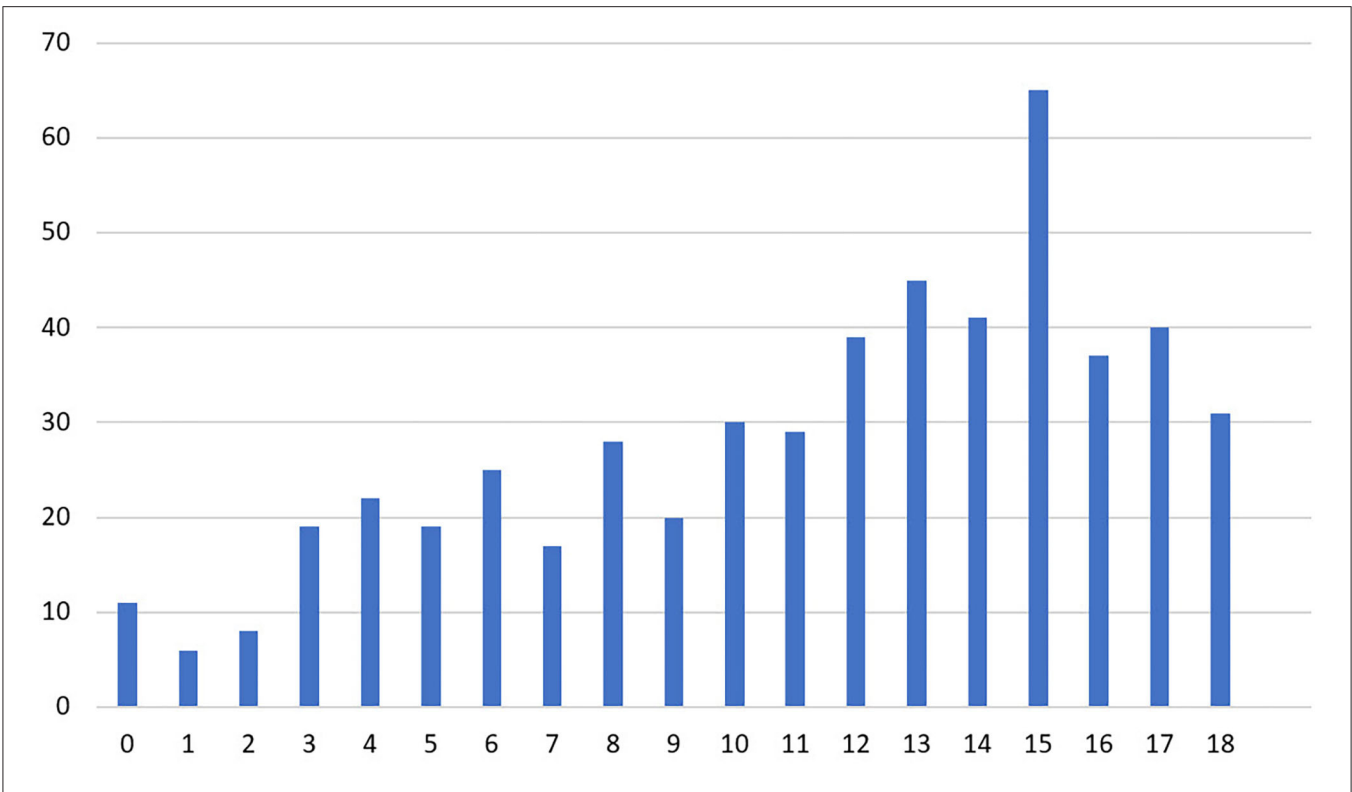
Three hundred and fifty-seven (67.1%) participants scored 10 or higher for EE, indicating a higher risk of burnout syndrome (see **Figure 2**). A Spearman's rank-order correlation test identified a positive correlation between gender and EE score [ $r_s(530) = 0.099$ ;  $p = 0.022$ ]. There was a negative correlation between age and EE score [ $r_s(530) = -0.151$ ;  $p < 0.001$ ]. A significant negative correlation was found regarding years of experience [ $r_s(530) = -0.118$ ;  $p = 0.007$ ], while a significant positive correlation was identified between department type and EE score [ $r_s(530) = 0.113$ ;  $p = 0.009$ ], living in conflict area [ $r_s(530) = 0.13$ ;  $p = 0.003$ ], feeling stigmatized [ $r_s(530) = 0.174$ ;  $p \leq 0.001$ ], and working hours per week [ $r_s(530) = 0.125$ ;  $p = 0.004$ ]. There was no statistically significant correlation between EE score and marital status, living conditions, employment status, smoking, illicit drug use, internal displacement, verbal abuse, physical abuse, and number of shifts per month ( $p > 0.05$ ).

#### Depersonalization

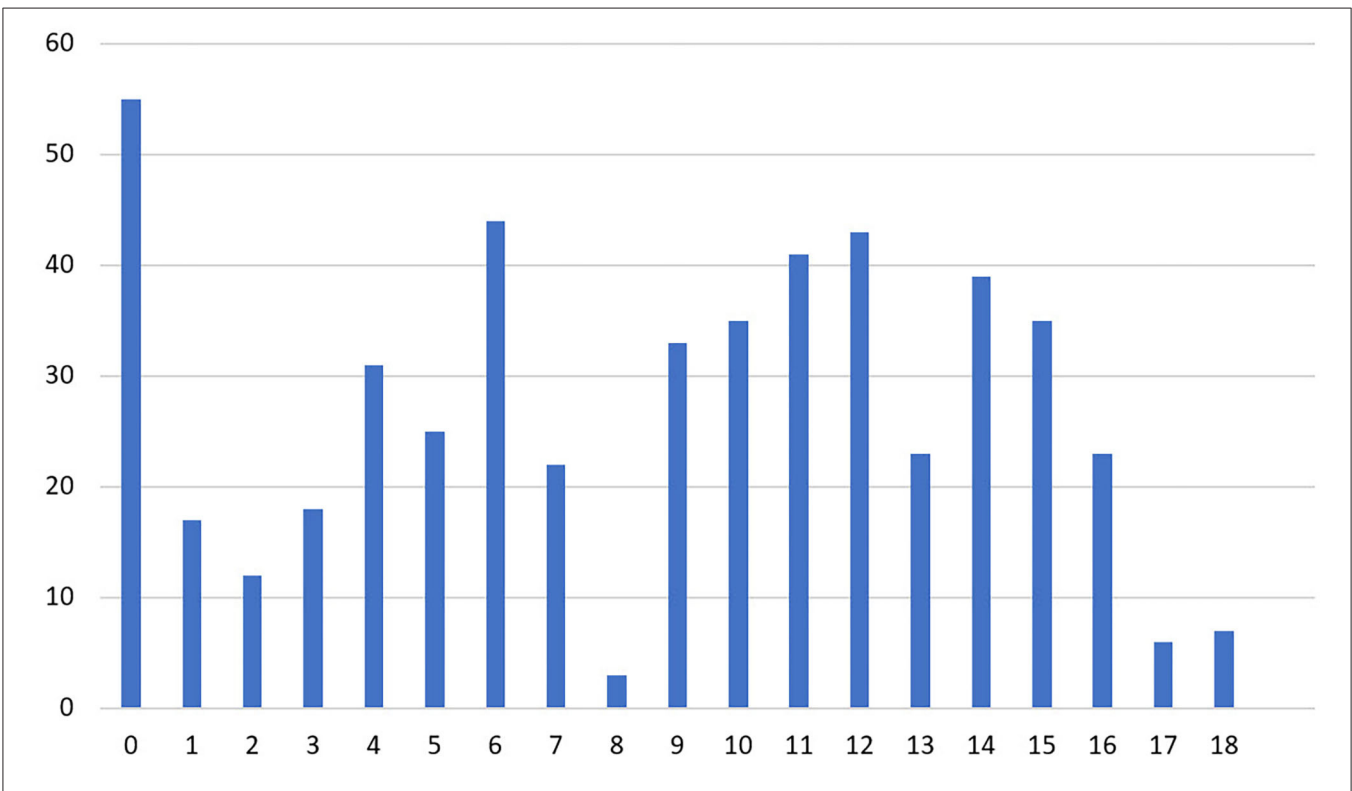
Two hundred and fifty-two (47.4%) participants scored 10 or higher for DP, indicating a higher risk of burnout syndrome (**Figure 3**). A Spearman's rank-order test showed a positive correlation between gender and DP score [ $r_s(530) = 0.129$ ;  $p = 0.003$ ], department type [ $r_s(530) = 0.105$ ;  $p = 0.015$ ], internal displacement [ $r_s(530) = 0.119$ ;  $p = 0.006$ ], and living in conflict area [ $r_s(530) = 0.09$ ;  $p = 0.038$ ].

However, there was no statistically significant correlation between DP score and age, marital status, living conditions, employment status, feeling stigmatized, smoking, illicit drug

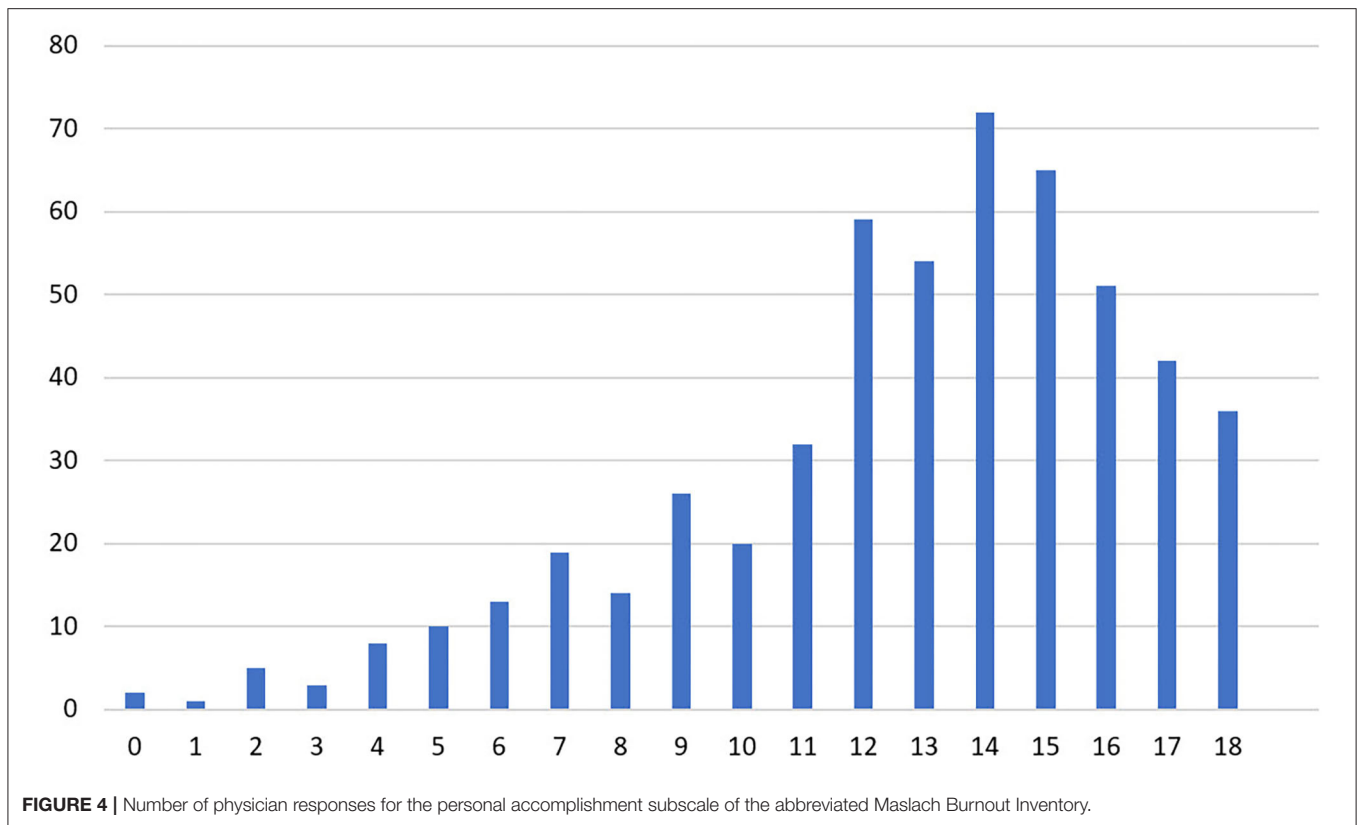




**FIGURE 2 |** Number of physician responses for the emotional exhaustion subscale of the abbreviated Maslach Burnout Inventory.



**FIGURE 3 |** Number of physician responses for the depersonalization subscale of the abbreviated Maslach Burnout Inventory.



use, verbal abuse, physical abuse, working hours per week, and number of shifts per month ( $p > 0.05$ ). Two hundred and thirty-six (44.4%) scored ten or more on both EE and DP, representing a higher risk of burnout syndrome.

### Personal Accomplishment

One hundred and twenty-one (22.7%) participants scored  $\leq 10$  for PA, indicating a higher risk of burnout syndrome (Figure 4). A Spearman's rank-order correlation test indicated that none of the study subject characteristics were correlated with PA score such as gender, marital status, age, years of work experience, department, living conditions, employment, feeling stigmatized, smoking, illicit drug use, internal displacement, living in a conflict area, verbal abuse, physical abuse, working hours per week, and number of night shifts per month ( $p > 0.05$ ).

## DISCUSSION

This study aimed to assess burnout among healthcare workers in departments which are high-risk for COVID-19 in Libya, which is currently experiencing a civil war. To our knowledge, the present study is the first to examine burnout syndrome during COVID-19 in a civil war setting.

The present study demonstrated a high prevalence of anxiety and depression among physicians during the COVID-19 pandemic amidst the civil war. The study provided a justified sample size of 532 physicians working on the frontlines of the pandemic in March and April of 2020. The response rate

and data completion were in good range. Risk of burnout scores reported by participants were 67.1% for emotional exhaustion, 47.4% for depersonalization, and 22.7% for lower personal accomplishment. However, 44.4% have both emotional exhaustion and depersonalization.

In our study, gender (35) was associated with both high EE and high DP. However, it was not associated with a low PA. In terms of age, being 35 years or older was associated with high depersonalization. Marital status was not associated with high levels of burnout. High-risk departments for COVID-19 were significantly associated with high EE and DP; specifically, those in the surgical department, emergency department, and intensive care units were more likely to have high EE and DP. Personal accomplishment was not associated with the department or professional specialty. Employment sector, i.e., government or private, was not found to be associated with burnout. In addition, fear of COVID-19 infection was associated with higher EE and DP.

Years of work experience was statistically associated with personal accomplishment. Our findings indicated that those with higher personal accomplishment scores were those with less working experience, and those with more experience felt less accomplishment. Smoking and illicit drug use were not associated with EE or DP. Feelings of stigmatization due to COVID-19 was associated with high scores in DP. In addition, verbal abuse was associated with DP only. Internal displacement and verbal abuse were associated with higher risk of DP. Living in conflict area was associated with higher risk of EE.

We observed that burnout prevalence among Libyan physicians was higher than in other countries. A study on radiology residents in the USA found that high EE, high DP, and low PA scores were reported by 37, 48, and 50% of participants, respectively (42). A further study conducted among Iranian healthcare workers reported participant scores of 12.3, 5.3, and 43% for high EE, high DP, and low PA, respectively (43). In Nigeria, a study conducted among residency training physicians found that 45.6% of physicians had high EE, 57.8% had high DP, and 61.8% had low PA. These findings were similar to those of the present study. However, a systematic review and meta-analysis of 4,664 medical residents found that the overall prevalence of burnout was 35.7% for surgical staff, and critical care workers had a higher prevalence of 40.8% (44). Additionally, a study conducted in Malaysia showed a burnout prevalence of 26.5% among junior doctors (45), and another study in Saudi Arabia indicated that 25.2% of physicians can be classified as having burnout (35). This wide variation is explained by socioeconomic and cultural differences, as well as the differences in healthcare infrastructure among these countries. However, a study in the United States found that about 50% of physicians suffer from burnout, which is similar to our results (46).

Burnout is known to be highly prevalent among physicians due to the psychologically demanding nature of the profession. Physicians are also exposed to a high level of socioeconomic pressure that may lead to burnout. Burnout has been found to be a risk factor for training attrition, suicide, and low quality of life. It has further been linked with sleep deprivation, family issues, and feeling overwhelmed with tasks and paperwork (20). In addition, burnout was associated with a high level of medical errors and a decreased level of patient care (47). Therefore, interventions aimed at reducing the stress levels of physicians are needed to improve well-being and quality of life among this population (48). For example, coaching for female physicians who are undergoing strain and experiencing stress about starting a family, and need external support from general practitioners, have been suggested in previous research (49).

There are a number of contributing factors for the increased level of burnout among Libyan physicians found in this study. First, due to the country's economic crisis, these healthcare workers are irregularly compensated and suffer socioeconomic hardships. Second, physicians are subject to a high level of abuse by patients and militias (50). The present study found that the prevalence of verbal abuse and physical abuse is 57 and 17.5%, respectively. Additionally, the civil war has caused displacement among physicians; 32.5% of physicians have left their homes due to the conflict. This situation places more pressure on these healthcare professionals, who fear their homes being destroyed or taken over by militias (51). Finally, they have concerns regarding the COVID-19 pandemic. The physicians fear being infected and infecting their families. They also have concerns about the shortage of treatment supplies and personal protective equipment (52, 53).

The present study has several limitations. First, because of the observational study design, we were unable to determine causation or demonstrate strong relationships between variables.

Therefore, larger studies are needed to examine predictive factors and to focus on other contributing factors that were not included in the present study. Second, the present study was conducted in one country where physicians face multiple stressors, including COVID-19, civil war, financial crisis, and a scarcity of mental health centers, which can explain the high level of burnout we observed. In addition, we believe that the fear of stigmatization may have resulted in response bias. Another limitation is that there is no standard definition of burnout. Although the aMBI is a validated tool that can detect and screen those who are at high risk of burnout, some studies have discussed the overestimation of the tool's effectiveness (32, 54, 55).

This study highlights the importance of addressing burnout among healthcare workers. Issues of burnout should be prioritized by authorities. This study identified a high demand for physician support interventions such as social support programs, financial support, and increased security measures in hospitals to prevent and decrease abuse. Furthermore, there is a need to recognize external contributing factors and the impact they have on physician's lives, such as internal displacement and living in conflict areas. Thus, the government should provide support in these areas to prevent humanitarian crises.

In conclusion, the rising prevalence of mental disorders among physicians and inadequate availability of healthcare facilities during the COVID-19 pandemic and civil war has demonstrated the need for healthcare policies to address the well-being of healthcare workers to decrease the risk of medical negligence, deteriorating mental health, and suicide.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Bioethics Committee of the Biotechnology Research Center in Libya. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MELh analyzed and interpreted the data, supervised the project, and wrote the first draft of the manuscript. All authors contributed to the study design and data collection. All authors have read and approved the final manuscript.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2020.579563/full#supplementary-material>

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Depressive Symptoms, Anxiety Disorder, and Suicide Risk During the COVID-19 Pandemic

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This study reviews the existing literature on psychiatric interventions for individuals affected by the COVID-19 epidemic. My article cumulates previous research on how extreme stressors associated with COVID-19 may aggravate or cause psychiatric problems. The unpredictability of the COVID-19 epidemic progression may result in significant psychological pressure on vulnerable populations. Persons with psychiatric illnesses may experience worsening symptoms or may develop an altered mental state related to an increased suicide risk. The inspected findings prove that psychological intervention measures for patients affected by the epidemic should be designed and personalized adequately. Preventive measures seek to decrease infection rates and cut down the risk of the public healthcare system to eventually be overburdened. Throughout the COVID-19 crisis, people with psychiatric illnesses may confront a decrease in mental health services. As limitations in the current review, by focusing only on articles published in journals indexed in Web of Science, Scopus, and ProQuest, I inevitably disregarded other valuable sources. Subsequent research directions should clarify the effectiveness of online mental health services in providing remote psychiatric interventions to individuals affected by the COVID-19 epidemic.

**Keywords:** depression, anxiety, suicide, symptom, COVID-19

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## INTRODUCTION

COVID-19 has placed a significant strain on health systems on a large scale (Kelly, 2020b). There may be a prevalent deterioration of mental health in the affected people (Sønderskov et al., 2020). Being confined in self-isolation or quarantined may have short- to long-term adverse consequences on the mental health of affected individuals (Mukhtar, 2020). Emotional, physical, and mental fatigue may occur as a result of immoderate and persistent stress (Zhang et al., 2020a). In September 2020, I undertook a systematic review of Web of Science, Scopus, and ProQuest, employing Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines. The inclusion criteria were (i) publication date: 2020 only, (ii) original empirical research, review articles, and editorial materials having non-theoretical content, (iii) written in English, and (iv) covering “COVID-19,” “depressive symptoms,” “anxiety disorder,” and “suicide risk” as search terms. I excluded from the review (i) books, (ii) proceedings papers, and (iii) theoretical comments. I have employed the Systematic Review Data Repository (SRDR), a powerful tool for the extraction, handling, and inspection of data for the systematic review. As I focused on research published exclusively this year, only 193 various types of articles met the eligibility criteria. By removing

those whose results were inconclusive, unconfirmed by replication/retracted, too general, or having similar titles, I selected 68, mainly empirical, sources (Table 1).

## HEALTH-RISK COVID-19 BEHAVIORS ASSOCIATED WITH DEPRESSIVE SYMPTOMS

Adequate conformity to spatial distancing in addition to home confinement, self-isolation, and quarantine may have the repercussion of social disconnection with adverse effects for psychological wellbeing (Mesa Vieira et al., 2020). The mandatory and beneficent quarantine has led to an unwitting outcome of escalated stress in old individuals dwelling in nursing homes who have a high risk of contracting COVID-19, in conjunction with increased morbidity and mortality (Padala et al., 2020). Low education level, job loss and unemployment stress, post-traumatic stress disorder symptoms, and adverse coping styles are the main determinants of mental health during the COVID-19 pandemic (Liang et al., 2020).

Fiorillo and Gorwood (2020) insist that persons who have been in direct or indirect contact with COVID-19 infected patients, who are easily affected by biological or psychosocial stressors (e.g., individuals having mental health issues), having a significant level of exposure (e.g., frontline healthcare providers), or following COVID-19 pandemic-related news (Popescu Ljungholm and Olah, 2020) provided by mainstream journalism organizations or social media platforms (Bratu, 2020a,b; Lăzăroiu et al., 2020; Rommer et al., 2020; Sheares et al., 2020) are at risk of mental health and psychosocial effects. Given that extreme stressors may aggravate or cause psychiatric problems, there will be an intensification of mental health issues, behavioral perturbations, and substance use disorders. Duan and Zhu (2020) assert that with disease evolution, clinical symptoms come to be critical and psychological issues in COVID-19 infected patients will aggravate, and thus psychological intervention measures for patients affected by the epidemic should be designed and personalized adequately.

Cao et al. (2020) show that the COVID-19 epidemic has generated excruciating psychological pressure related to the risk of passing away from infection. Having the loved ones infected with COVID-19 is an independent risk determinant for long-endured fear. Cheung et al. (2020) remark that the swiftly increasing volume of COVID-19 infected patients has been experiencing persistent fear and limitations of their current activities. Rigorous preventive measures (e.g., social distancing and extended quarantine) may adversely affect physical and psychological wellbeing, inter-familial connections and socioemotional support networks of the general population (Mircică, 2020), possibly exacerbating psychiatric morbidity, while seeking to decrease infection rates and cut down the risk of the public healthcare system to eventually be overburdened. Rajkumar (2020) writes that subsyndromal mental health issues constitute a typical reaction to the COVID-19 pandemic: symptoms of anxiety and depression in addition to self-reported stress are prevalent psychological responses and may be related to disturbed sleep.

Druss (2020) says that individuals having severe mental illnesses along with the public mental healthcare system pivotal in attending to them are at significant risk. Such patients need timely, precise information concerning approaches for diminishing risk, while discerning when to ask for COVID-19 medical treatment, and, if they are employed, they may not have a break from work and may fall short of adequate insurance coverage to secure COVID-19 testing or medical treatment. Undeveloped social networks may restrict chances to gain support from the loved ones should people having severe mental illnesses get infected with COVID-19. Apprehension may both intensify and be magnified by prevalent anxiety disorders and depressive symptoms. Shigemura et al. (2020) reveal that apprehension of the unknown during the COVID-19 crisis increases anxiety and depression levels in healthy persons and in individuals having preexisting mental health conditions, emotional responses comprising intense psychosocial distress and insecurity. Negative societal behaviors related to COVID-19 are mainly triggered by panic and misrepresented perceptions of risk.

DePierro et al. (2020) observe that the COVID-19 pandemic may give rise to high rates of post-traumatic stress disorder, depression, and substance misuse among affected people. Most individuals from underserved groups may confront chronic mental health effects by lacking the ability to access first-rate healthcare services. Mental health monitoring, timely detection of persons at risk, and medical treatment notwithstanding financial constraints are pivotal for reducing chronic distress. By harnessing cutting-edge technological devices (Nica et al., 2020; Pridmore et al., 2020; Taylor, 2020; Wright and Birtus, 2020), mental health support services can be adopted adequately by use of video telehealth platforms. Huang and Zhao (2020) hold that young persons, individuals spending excessive time mulling over the COVID-19 outbreak, and frontline healthcare providers are at significant risk of mental illness (Allen and Cug, 2020), possibly developing anxiety symptoms. The unpredictability of the COVID-19 epidemic progression may result in significant psychological pressure on vulnerable populations. Age and time

**TABLE 1** | Topics and types of papers identified and selected.

Topic	Identified	Selected
COVID-19	193	68
depressive symptoms	124	61
anxiety disorder	84	56
suicide risk	75	45
<b>Type of Paper</b>		
original empirical research	103	41
review article	6	1
editorial materials	44	26
books	2	0
proceedings papers	2	0
theoretical comments	36	0

Source: Processed by the author. Some topics overlap.

spent by obsessing over COVID-19 are possible risk determinants for the psychological issues of the affected people who may have depressive symptoms and sleep problems.

On Holmes et al. (2020)'s view, COVID-19 may affect the brain or generate immune reactions that have further detrimental consequences on infected patients' brain function and mental health, leading to harmful behaviors. The COVID-19 lockdown and social isolation may have mental health consequences for vulnerable groups, that is persons with underlying mental or physical health disorders or who show a tendency to be psychologically unwell. Psychological processes and social effects (e.g., brain function, cognition, emotion, and behavior) associated with COVID-19 (Clark, 2020a,b) may affect mental health of certain individuals who are on risk of anxiety, depression, stress, and self-inflicted violence. Remote work and job loss, together with social and physical distancing have unexpectedly discontinued numerous social prospects relevant to physical and mental health.

The COVID-19 epidemic has generated extreme stressors that may aggravate or cause psychiatric problems, affecting the brain or generating immune reactions. Emotional responses comprise intense psychosocial distress and insecurity. Such patients need timely, precise information concerning approaches for diminishing risk.

## COVID-19 RISK FACTORS RELATED TO EMOTIONAL AND ANXIETY DISORDERS

COVID-19 pandemic-related, compulsory self-isolation, home confinement, and quarantine are related to poor psychological and physical health (Balanzá-Martínez et al., 2020). Taking into account the COVID-19 infection and deficiencies in personal protective equipment, direct access to patients is restricted excepting for the frontline health care providers who are trained to supply adequate medical care (Mohindra et al., 2020). Psychological interventions and social support provided to vulnerable people to handle panic, anxiety, and confinement during the COVID-19 pandemic may be efficient by use of mobile health platforms (Sim et al., 2020).

Torales et al. (2020) stress that, during COVID-19 pandemic, individuals' emotional reactions tend to comprise extreme fear and confusion (Rommer, 2020; Thompson, 2020), while adverse social behaviors are typically activated by anxiety and misrepresented perceptions of risk. Psychosocial stressors are mainly associated with panic (Breillat and Birtus, 2020) generated by isolation or quarantine and mental instability among the affected individuals. Venkatesh and Edirappuli (2020) suggest that individuals with underlying mental illness may be affected by restricting their interpersonal relations that are pivotal to their mental healthcare, in addition to diminished access to possibly delayed psychiatric services. Personal care workers can provide specialized support (Moore and Kolencik, 2020; Sheares, 2020) by remotely monitoring individuals at risk of mental illness and vulnerable populations. Serafini et al. (2020) note that inequities and intolerance as regards to marginalized people (e.g., aged individuals having mental disorders) may be

typically increased in situations of social distress, panic, irritation, and apprehension.

Lima et al. (2020) put it that primary care providers working in critical and intensive care units and hospitals should receive specialized training for supplying mental healthcare. In hopes of better handling the pressing psychological issues of individuals affected by the COVID-19 crisis, psychological crisis interventions can be enhanced by harnessing Internet technology (Lyons and Lăzăroiu, 2020), as particularly older persons having psychiatric conditions may endure additional distress. Xiang et al. (2020b) emphasize that psychiatric patients constitute an extremely vulnerable population to get infected with COVID-19, but the shortage of adequate medical procedures, insufficient mental health resources, and unsatisfactory training may prevent mental health professionals from supplying mental health services in hospitals and isolation infectious units. Assimilating mental health crisis interventions coherently in the prevalent implementation of disease prevention and treatment may curb the risk of COVID-19-related detrimental psychological outcomes.

Roy et al. (2020) state that the stress and worries in society are disturbing each person to unequal extents. There are amplified anxieties and concerns among the general population about acquiring the COVID-19 infection. Individuals have significant perceived needs to handle their mental health issues, reporting fearfulness, discomfort, and obsession about contracting such a life-threatening infectious disease, in addition to sleep disturbances. Zhang et al. (2020c) maintain that, for COVID-19 infected patients with psychiatric disorders, antiviral drugs should be used together with psychotropic ones, as otherwise they can experience deterioration of their mental illness. Due to stressor events, symptoms such as anxiety, nervousness, and insomnia may occur in such patients. Kavour (2020) posits that deterioration of severe mental disorders associated with COVID-19 may bring about unsatisfactory hygiene, difficulties in practicing preventive strategies, dearth of prompt reporting or pursuing medical attention, and limitations in conforming to required treatment.

On Kelly (2020a)'s reading, infectious disease outbreaks such as COVID-19 bring about mental health conditions (e.g., psychiatric disorders), that is the illness brought about by the virus itself (typically self-limiting but lethal, particularly in the ill-protected people, the old individuals, and the persons having preexistent health conditions) and the fear, apprehension, and psychological issues (Dobson-Lohman and Potcovaru, 2020) related to the pandemic. Vulnerable populations (e.g., homeless persons, individuals having infirmities, chronically ill people, etc.) are at particular risk to have summative risk determinants (e.g., unsatisfactory physical and psychological health, reduced access to services, inadequate control over their ordinary activities, etc.). People with mental illness are less probable to access public health advice about COVID-19, more expected to contract the virus, and less plausible to receive expeditious adequate diagnostic and treatment services.

Moghanibashi-Mansourieh (2020) indicates that individuals' anxious responses may lead to socially disruptive behaviors such as mass panic buying. The rampancy of mental health disorders,



particularly anxiety, diminishes affected persons' resiliency against the COVID-19 infection. Xiang et al. (2020a) find that confirmed or suspected COVID-19 patients may experience uncertainty and apprehension as regards the repercussions of acquiring a potentially deadly infection (Dawson and Potcovaru, 2020; Mihăilă and Martin, 2020; Popescu Ljungholm, 2020), while individuals in home confinement and self-isolation may confront frustration, sadness, and annoyance. Compulsory contact tracing and extended quarantine, which constitute important public health reactions to the COVID-19 outbreak, may heighten patients' anxiety and remorse as regards the consequences of contagion and stigma on their loved ones.

Infectious disease outbreaks such as COVID-19 bring about mental health conditions as individuals' emotional reactions tend to comprise extreme fear and confusion, while their anxious responses may lead to socially disruptive behaviors. Symptoms such as anxiety, nervousness, and insomnia may occur in COVID-19 infected patients with psychiatric disorders.

## COVID-19-RELATED SUICIDAL IDEATION AND BEHAVIOR

The level of risk of COVID-19 spread among persons having a severe mental illness may be more significant than that in the general population, as a consequence of constant unhealthy behaviors and standards of living (Starace and Ferrara, 2020). Individuals who stopped working as a result of the COVID-19 pandemic may experience poor mental and physical health conditions in addition to psychological distress (Zhang et al., 2020b).

As Ahmed et al. (2020) put it, social isolation and economic downsides on a large scale has led to serious psychological troubles for a lot of individuals, configuring severe neurological symptoms of COVID-19 infection. Confirmed patients are afraid of being abandoned by society and in addition to the remorse of having infecting others the outcome may be mental disturbance. The incidence of psychological issues is considerably higher among persons whose colleagues, friends or family members got infected or passed away from COVID-19. Yao et al. (2020) show that epidemics do not exert influence on all populations uniformly and imbalances can facilitate the transmission of infections. Unawareness of the distinctive effect of the epidemic on people with mental health disorders may impede any purposes to slow down increased escalation of COVID-19, while amplifying current health inequalities. Such patients may be more considerably affected by the emotional reactions generated by the COVID-19 epidemic, giving rise to deterioration of a mental health condition due to significant vulnerability to psychological distress in contrast to the general population.

Hao et al. (2020) demonstrate that comprehending the psychological consequences on patients with mental disorders throughout the COVID-19 pandemic may clarify how to set up an efficient immunopsychiatry service. Determinants to deteriorating mental health are possible postponement in supplying psychotropic medications, deficiency in access to primary care and outpatient emergency rooms, significant

financial hurdles, anxiety of getting infected with COVID-19 (Hughes, 2020), prolonged interval of confinement and penurious living conditions caused by paucity of supplies. Such abrupt, unexpected changes may result in feelings of anguish and heightened suicidal ideation among people with psychiatric illnesses. Nearly all the stabilized psychiatric patients need to receive out-hospital treatment to diminish the risk of infection. Immunopsychiatry services should provide point-of-care test for COVID-19 detection, while negative results may offer moral support to persons with mental disability.

Gunnell et al. (2020) observe that the spread of COVID-19 pandemic may trigger distress, leaving affected individuals exposed to mental health disorders (Scott et al., 2020) and suicidal ideation and behavior. Severe mental health issues may be experienced by the healthy population and by persons having significant levels of vulnerability to COVID-19 illness (e.g., primary care providers and individuals who have contracted the virus). Suicide risk may be amplified due to stigma toward infected patients and their family members. Persons with psychiatric illnesses may experience worsening symptoms or may develop an altered mental state related to an increased suicide risk (e.g., anxiety, depression, and post-traumatic stress).

Reger et al. (2020) state that exceptional public health undertakings to regulate the transmission of COVID-19 will decrease the rate of further infections, but the likelihood of detrimental consequences on suicide risk is considerable. Social relationships are pivotal in suicide prevention as self-isolation and lack of companions may exacerbate suicide risk. Diminished access to mental healthcare may adversely impact patients having suicidal ideation. Aggravated physical health issues may escalate risk behavior for old patients, in whom health issues are related to deliberately killing themselves. Wang et al. (2020) point out that prolonged lockdown may have severe detrimental consequences on mental health. The persistent link between physical symptoms and the psychological effect of COVID-19 indicates the necessity of developing a swift diagnostic test having extended availability to attenuate the psychological repercussions and psychiatric symptoms endured by affected people.

On Pfefferbaum and North (2020)'s account, ambiguous prognoses, imminent drastic scarcities of resources for COVID-19 testing and treatment and for ensuring the safety of frontline healthcare providers from infection, enforcement of unusual public health actions that interfere with personal human rights, significant and increasing financial losses, and contradictory directives from governing bodies and medical experts (Lăzăroiu and Adams, 2020) constitute main stressors resulting in pervasive emotional distress and heightened risk for psychiatric disorders. Individuals who get infected with COVID-19, people at increased risk to contract the disease, and persons having preexisting psychiatric or substance use issues may develop adverse psychosocial reactions.

People with mental health disorders may be more considerably affected by the emotional reactions generated by the COVID-19 epidemic. Affected individuals are exposed to mental health disorders and suicidal ideation and behavior, resulting in pervasive emotional distress and heightened risk for psychiatric disorders. Social relationships are pivotal in suicide prevention.

## CONCLUSION

The swift spread of COVID-19 and important death rate may aggravate the risk of mental health issues and intensify current psychiatric symptoms, damaging their proper functioning and cognition to a greater extent (Yang et al., 2020). The conclusions drawn from the above analyses indicate the differential psychiatric distress of COVID-19 affected populations. Psychological processes and social effects associated with COVID-19 may affect mental health of certain individuals who are on risk of anxiety, depression, stress, and self-inflicted violence. Most individuals from underserved groups may confront chronic mental health effects by lacking the ability to access first-rate healthcare services. As limitations in the current review, by focusing only on articles published in journals indexed in Web of Science, Scopus, and ProQuest, I inevitably disregarded other valuable

sources. Subsequent research directions should clarify the effectiveness of online mental health services in providing remote psychiatric interventions to individuals affected by the COVID-19 epidemic.

## AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.572699/full#supplementary-material>

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# Perinatal Depression of Exposed Maternal Women in the COVID-19 Pandemic in Wuhan, China

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**Objective:** This study aims to investigate perinatal depression in women who gave birth during the COVID-19 pandemic in Wuhan, and to evaluate the effect of the pandemic on perinatal depression prevalence.

**Methods:** A cross-sectional investigation was conducted into women hospitalized for delivery in Hubei Maternity and Child Healthcare Hospital from December 31, 2019 to March 22, 2020, a period which encompasses the entire time frame of the COVID-19 pandemic in Wuhan. The Edinburgh Postnatal Depression Scale (EPDS) was adopted to evaluate perinatal depression status. A Chi-square test and logistic regression model were utilized for data analysis.

**Results:** A total of 2,883 participants were included, 33.71% of whom were found to suffer from depressive symptoms. In detail, 27.02%, 5.24%, and 1.46% were designated as having mild, moderate, and severe depressive symptoms, respectively. The perinatal depression prevalence increased as the COVID-19 pandemic worsened. Compared to the period from December 31, 2019 to January 12, 2020, perinatal depression risk significantly decreased within the 3 weeks of March 2–22, 2020 (1st week: OR = 0.39, 95% CI: 0.20, 0.78; 2nd week: OR = 0.35, 95% CI: 0.17, 0.73; and 3rd week: OR = 0.48, 95% CI: 0.25, 0.94); and the postnatal depression risk significantly rose within the four weeks of January 27–February 23, 2020 (1st week: OR = 1.78, 95% CI: 1.18, 2.68; 2nd week: OR = 2.03, 95% CI: 1.35, 3.04; 3rd week: OR = 1.48, 95% CI: 1.02, 2.14; and 4th week: OR = 1.73, 95% CI: 1.20, 2.48).

**Conclusion:** The dynamic change of perinatal depression was associated with the progression of the COVID-19 pandemic among new mothers who were exposed to the pandemic. An elevated risk of postnatal depression was also observed during the COVID-19 pandemic.

**Keywords:** COVID-19, EPDS, prenatal, postnatal, depression

## INTRODUCTION

In December 2019, a novel virus, officially named SARS-CoV-2, caused an outbreak of pneumonia in Wuhan. The disease was named coronavirus disease 2019 (COVID-19) by the WHO. The newly identified SARS-CoV-2 virus was one of high transmissibility (1). The COVID-19 pandemic has since spread across China and around the world. On January 30, 2020, the WHO declared the virus a public health emergency of international concern, and then a worldwide pandemic on March 12, 2020 (2). The ongoing pandemic has posed a great threat to the physical and mental health of affected individuals.

Chinese governments have taken extensive and efficient actions to control the pandemic. Many provinces and regions in China implemented highest-level public health measures in response to the emergency. The *Guidance Manual on the Prevention and Control of Novel Coronavirus-Infection Pneumonia in the Community* issued by the national government on January 28, 2020, suggested traffic restrictions, home quarantine, and other social distancing measures (3). Besides, to avoid cross-infection opportunities in hospitals, designated hospitals and medical centers were established to exclusively treat the SARS-CoV-2 infection.

Global public health emergencies may promote psychological disorders in affected individuals. The severe acute respiratory syndrome (SARS), which caused a worldwide epidemic in 2003, equipped China with valuable lessons on how to control and prevent COVID-19, and has evidenced the importance of public psychological crisis management in the control of major public health events (4). The SARS epidemic was demonstrated to have negative psychological effects on infected patients (5), health professionals (6), students (7), and the general public (8). Scholars have called for attention to be drawn to the psychological disorders related to COVID-19 pandemic exposure (9). To tackle the potential psychological problems of affected individuals, the Chinese Center for Disease Control and Prevention issued the *Guiding Principles for Intervention in Emergency Psychological Crises during the Novel Coronavirus-Infection Pneumonia Epidemic*, and announced that an intervention of psychological crises should be involved in the whole deployment of COVID-19 pandemic prevention and control (10). Moreover, some hospitals and psychologists provided free online courses on psychological crisis treatment for COVID-19 affected individuals (11).

However, there are limited mental health services available for maternal women, as well as evidence for efficient management against the psychological effect of the pandemic. As a vulnerable group affected by high levels of estrogen and progesterone, the upper respiratory tract mucosa of pregnant women thickens causing edema and mild congestion, which are prone to respiratory infection. And SARS-CoV-2 infected pregnant patients were presented to have poor prognoses. Therefore, perinatal mothers deserve priority in psychological health guarantees (12). Maternal depression is one of the most common complications among perinatal women, which may result in devastating life events to mothers, infants, and families (13). Perinatal depression may have negative effects on offspring

well-being throughout their whole life (14–16). The mortality rate attributed to perinatal depression resulted suicide even exceeds that caused by postpartum hemorrhage and pregnancy induced hypertension (17). New mothers need delivery-related medical services in hospitals where they may be confronted with nosocomial SARS-CoV-2 infection, which possibly increases their psychological crisis during the perinatal period. With all this in mind, the perinatal depression status of maternal women is worthy of assessment during the entire COVID-19 pandemic period.

This study aims to investigate the prevalence of perinatal depression in hospitalized maternal women and to evaluate the depression risk in relation to COVID-19 pandemic exposure. The findings of our study will provide helpful experiences for the handling of subsequent large-scale psychological crises among perinatal women.

## METHODS

### Data Sources and Study Population

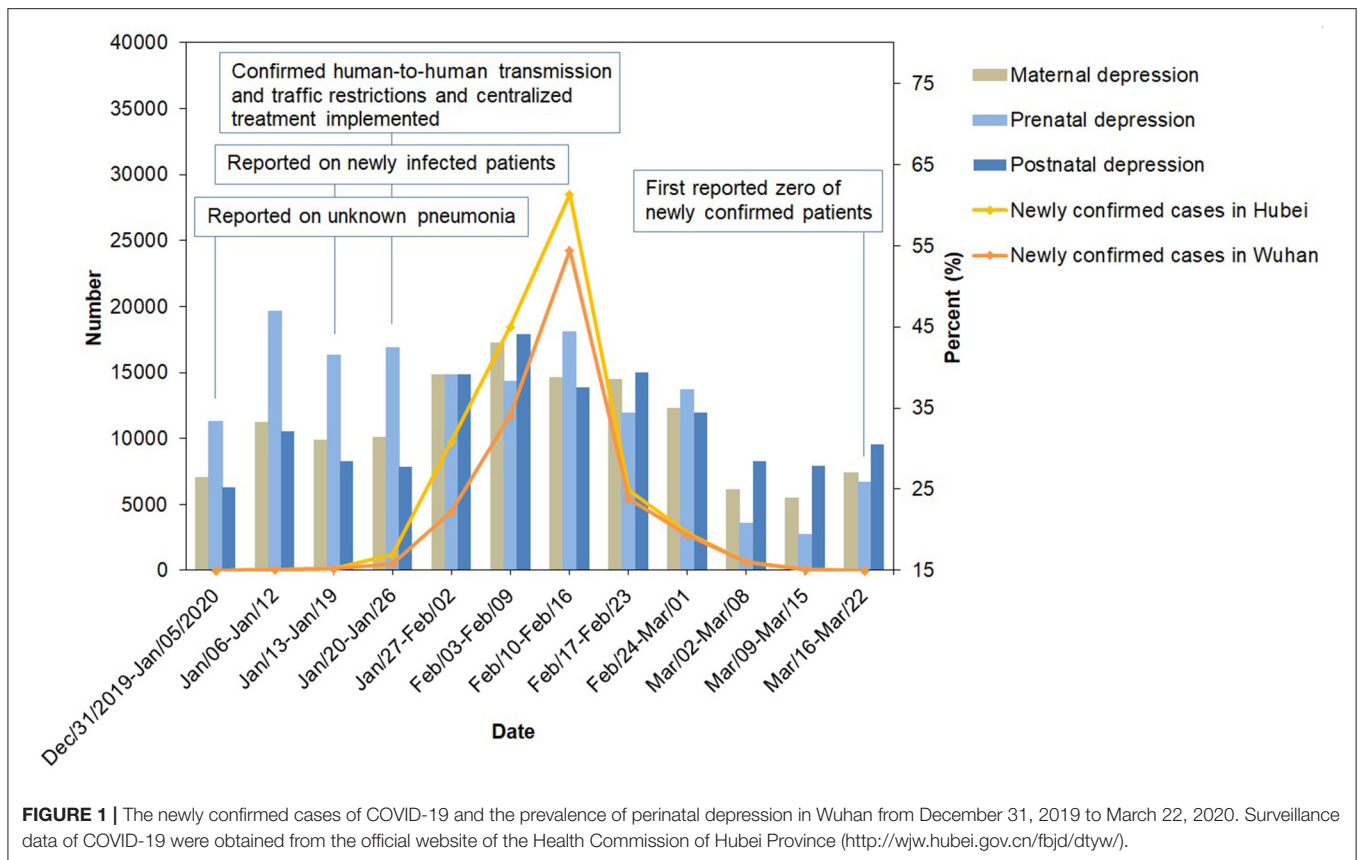
The participants were general healthy pregnant women receiving delivery services at Hubei Maternity and Child Healthcare Hospital in Wuhan, one of the largest cities in central China. The hospital is the largest Class III Grade A maternity center in Hubei Province. In 2018, one out of five newborns in Wuhan were expected to be delivered in this hospital. Their delivery help services mainly provided for women not infected with COVID-19 during the pandemic.

The study conducted included hospitalized individuals with a gestation of 28 weeks and above or  $\leq 7$  days after delivery (as of the perinatal period). Our study was approved by the Ethics Committee of the hospital. The cross-sectional study was implemented from December 31, 2019 to March 22, 2020, a period that spanned the whole COVID-19 pandemic in Wuhan. All participants provided oral informed consent before the investigation, in line with the Declaration of Helsinki regarding human participation. The questionnaire survey was mainly completed online using the WeChat-based survey program Questionnaire Star (questionnaire link: <https://www.wjx.cn/jq/55187836.aspx>), which was widely used during the COVID-19 pandemic. A total of 5% of the participants completed a paper questionnaire with the exact same items due to the temporary unavailability of their mobile phone in hospital.

### Variable Definitions

#### Exposure Variable

The COVID-19 pandemic was regarded as an exposure variable. The daily reported number of confirmed COVID-19 patients was key to the psychological responses of the exposed new mothers, manifesting perinatal depression during the entire epidemic period. Sequential events occurred with the updated measures against the pandemic, including: 1) the first reported patients with unknown pneumonia on December 31, 2019; 2) newly reported patients with an onset of January 16, 2020 on January 18, 2020; 3) the official announcement of the human-to-human transmission on January 20, 2020; 4) the beginning of inner-city traffic restrictions and home quarantine on January



23, 2020; 5) centralized treatment and quarantine strategies to the confirmed patients, suspected patients, patients with a fever symptom, and close contacts; and 6) the first reported zero number of new COVID-19 patients up to March 18, 2020 on March 19, 2020 (18, 19). In response to the concurrent COVID-19 pandemic, maternal women may suffer a different degree of perinatal depression throughout several time intervals.

### Covariates

Covariates included sociodemographic variables such as age (< 25, 25–29, 30–34, and > 34), ethnicity (Han and other), education (junior high or below, senior high, and college or above), Hukou (urban and rural), annual family income (<50,000 ¥, 50,000–100,000 ¥, more than 100,000 ¥, and unknown), delivery status (prenatal and postnatal), gravidity (1, 2–3, and  $\geq 4$ ), parity (0–1 and  $\geq 2$ ), gestational age (<37 and  $\geq 37$ ), health-related behaviors like prior history of traumatic delivery experiences (yes and no), sleep quality (good, fair, and poor), smoking (no, yes, and passive smoking), alcohol drinking (no and yes), and exercise (no and yes) during pregnancy.

Otherwise, most mothers lived with their family and family members played an important role in their social interaction. An Adaptation, Partnership, Growth, Affection, and Resolution Scale (APGAR) was used to evaluate the family function of each respondent. The scale was developed by Smilkstein and has been widely used (20, 21). It consists of five dimensions (adaptation, partnership, growth, affection, and resolution) (22). Each item

was rated on a scale from 0 (*hardly ever*) to 2 (*almost always*). The APGAR scale was translated into Chinese in this study and was confirmed to be of good internal consistency (Cronbach's  $\alpha = 0.80$ ). A final summarized score of 0–3, 4–6, and 7–10 indicated poor, fair, and good family functions (23).

### Dependent Variables

The Edinburgh Postnatal Depression Scale (EPDS) was used for perinatal depression assessment. The EPDS was compiled by Cox et al. (24) and has been proven to have good reliability and validity, and be suitable for depression assessment during pregnancy and postpartum periods. The scale comprises 10 items, each of which is scored on a four-point scale ranging from 0 to 3 by severity. Finally, the summarized score is classified into four grades, with 0–9, 10–16, 17–21, and 22–30 points indicating none, mild, moderate, and severe depression levels, respectively (25). The internal consistency of this scale was good in our study (Cronbach's  $\alpha = 0.92$ ).

### Statistical Analysis

The statistical analyses were performed using SAS 9.4 for Windows. A Chi-square test was used to analyze differences in categorical variables, including sociodemographic variables, health behavior factors, and the exposure variable. Multiple logistic regression models adjusted for the mentioned covariates were used to evaluate the dependency of perinatal depression risks on the exposures. Results of the multiple logistic regression

**TABLE 1** | Descriptive statistics for the sociodemographic variables of participants.

Variables	No depression N (%)	Depression N (%)	Total N (%)	$\chi^2$	P
Age				7.9910	0.0462
<25	86 (4.50)	40 (4.12)	126 (4.37)		
25-29	789 (41.29)	405 (41.67)	1,194 (41.42)		
30-34	791 (41.39)	368 (37.86)	1,159 (40.20)		
>34	245 (12.82)	159 (16.36)	404 (14.01)		
Total	1,911 (66.29)	972 (33.71)	2,883 (100.00)		
Ethnicity				0.1006	0.7511
Han	1,857 (97.23)	947 (97.43)	2,804 (97.29)		
Other	53 (2.77)	25 (2.57)	78 (2.71)		
Education					
Junior high or below	136 (7.12)	69 (7.10)	205 (7.11)	0.4932	0.7814
Senior high	259 (13.55)	141 (14.51)	400 (13.87)		
College or more	1,516 (79.33)	762 (78.40)	2,278 (79.01)		
Hukou				0.0008	0.9775
Rural	676 (35.37)	344 (35.43)	1,020 (35.39)		
Urban	1,235 (64.63)	627 (64.57)	1,862 (64.61)		
Family income (¥)				3.2618	0.3530
<50,000	233 (12.19)	127 (13.07)	360 (12.49)		
50,000-100,000	419 (21.93)	232 (23.87)	651 (22.58)		
≥100,000	1,017 (53.22)	483 (49.69)	1,500 (52.03)		
Unclear	242 (12.66)	130 (13.37)	372 (12.90)		
Delivery status				1.4369	0.2306
Prenatal	504 (26.78)	234 (24.68)	738 (26.08)		
Postnatal	1,378 (73.22)	714 (75.32)	2,092 (73.92)		
Gravidity				0.3191	0.5721
1	852 (46.18)	449 (47.26)	1,301 (46.55)		
2-3	799 (43.31)	405 (42.63)	1,204 (43.08)		
≥4	194 (10.51)	96 (10.11)	290 (10.38)		
Parity				0.1639	0.6856
0-1	1,225 (66.40)	638 (67.16)	1,863 (66.65)		
≥2	620 (33.60)	312 (32.84)	932 (33.35)		
Gestational age (weeks)				7.5788	0.0059
<37	168 (9.11)	118 (12.45)	286 (10.24)		
≥37	1,676 (90.89)	830 (87.55)	2,506 (89.76)		

No depression: EPDS score 0-9; depression: EPDS score 10-30.

model were reported as adjusted odds ratios (OR) and corresponding 95% confidence intervals (CI). All analyses were two-sided and a  $p$ -value of  $<0.05$  was considered statistically significant.

## RESULTS

A total of 4,895 inpatients in the hospital were eligible during the study period, and 2,937 of them agreed to participate in the survey. After removing those with incomplete data ( $n = 18$ ) and with prior depression ( $n = 36$ ), 2,883 participants were included in the statistical analysis. **Figure 1** shows the number of daily confirmed COVID-19 cases and the perinatal depression prevalence per week during the study period. From the end of 2019 when the first COVID-19 cases emerged in Wuhan,

the perinatal depression prevalence continued to increase along with the increasing number of daily reported COVID-19 cases. During the time intervals of January 13–19 and February 3–9, the daily reported number of new cases increased rapidly in Wuhan. Meanwhile, the depression prevalence rose from 30.99% within the week of January 13–19 to 42.98% within the week of February 3–9. The highest prenatal depression value was 46.97% within the week of January 6–12. And the highest postnatal value was 44.15% within the week of February 3–9. As the emergence of SARS-CoV-2 infections slowed down, the perinatal depression prevalence showed a downward trend from 42.98% during February 3–9 to 23.85% during March 9–15.

**Table 1** and **Supplementary Table 1** show the sociodemographic characteristics of participants stratified by depression levels. In total, 33.71% of all participants were



**TABLE 2** | Descriptive statistics for the health behavior factors of participants during pregnancy.

Variables	No depression N (%)	Depression N (%)	Total N (%)	$\chi^2$	P
Traumatic delivery experience				16.8512	<0.0001
Yes	115 (6.08)	100 (10.36)	215 (7.53)		
No	1,777 (93.92)	865 (89.64)	2,642 (92.47)		
Sleep quality				193.2296	<0.0001
Good	1,156 (60.94)	345 (35.60)	1,501 (52.37)		
Fair	661 (34.84)	495 (51.08)	1,156 (40.33)		
Poor	80 (4.22)	129 (13.31)	209 (7.29)		
Smoking				10.3242	0.0013
No	1,840 (97.05)	916 (94.63)	2,756 (96.23)		
Yes	56 (2.95)	52 (5.37)	108 (3.77)		
Drinking				0.7171	0.3971
No	1,851 (97.63)	937 (97.10)	2,788 (97.45)		
Yes	45 (2.37)	28 (2.90)	73 (2.55)		
Exercise				15.2252	<0.0001
No	706 (37.26)	432 (44.81)	1,138 (39.80)		
Yes	1,189 (62.74)	532 (55.19)	1,721 (60.20)		
Family function				77.5428	<0.0001
Poor	29 (1.52)	24 (2.47)	53 (1.84)		
Fair	73 (3.82)	143 (14.71)	216 (7.49)		
Good	1,809 (94.66)	805 (82.82)	2,614 (90.67)		

No depression: EPDS score 0-9; depression: EPDS score 10-30.

**TABLE 3** | Descriptive statistics for independent variables of participants during the COVID-19 epidemic.

Variables	No depression N (%)	Depression N (%)	Total N (%)	$\chi^2$	P
Period of COVID-19 epidemic				45.4120	<0.0001
December 31, 2019–January 5, 2020	78 (4.08)	28 (2.88)	106 (3.68)		
January 6–January 12	177 (9.26)	88 (9.05)	265 (9.19)		
January 13–January 19	167 (8.74)	75 (7.72)	242 (8.39)		
January 20–January 26	103 (5.39)	47 (4.84)	150 (5.20)		
January 27–February 2	143 (7.48)	92 (9.47)	235 (8.15)		
February 3–February 9	134 (7.01)	101 (10.39)	235 (8.15)		
February 10–February 16	213 (11.15)	135 (13.89)	348 (12.07)		
February 17–February 23	223 (11.67)	140 (14.40)	363 (12.59)		
February 24–March 1	203 (10.62)	109 (11.21)	312 (10.82)		
March 2–March 8	193 (10.10)	64 (6.58)	257 (8.91)		
March 9–March 15	166 (8.69)	52 (5.35)	218 (7.56)		
March 16–March 22	111 (5.81)	41 (4.22)	152 (5.27)		

No depression: EPDS score 0-9; depression: EPDS score 10-30.

found to have depressive symptoms, 27.02, 5.24, and 1.46% of which were indicative of mild, moderate, and severe depression, respectively (**Supplementary Table 1**). The majority of participants were aged 25–29 (41.42%), of Han race (97.29%), highly educated (79.01%), urban (64.61%), and had a family income of  $\geq 100,000$  ¥ (52.03%). The depression prevalence was higher (of marginal significance) in the participants over 34 years of age than those of  $\leq 34$  years (16.36 vs. 12.82%,  $p = 0.0462$ ).

**Table 2** and **Supplementary Table 2** show the health behavior factors stratified by depression levels. Most of the participants (92.47%) reported no previous traumatic delivery experience;

and those who experienced a traumatic delivery had a higher depression prevalence (10.36 vs. 6.08%,  $p < 0.0001$ ). Only 52.37% of participants reported a good sleep quality during pregnancy. Participants with a poor or fair sleep quality had significantly higher depression prevalence than those with a good sleep quality. Moreover, most participants did not smoke or drink alcohol during gestation. Compared to those without smoking habits, the participants who smoked either actively or passively had higher depression prevalence (5.37 vs. 2.95%,  $p = 0.0013$ ). Participants who did not exercise during pregnancy had more prevalent depression than those who exercised regularly (44.81

**TABLE 4** | Logistic regression analysis for the effects of independent variables on prenatal depression and postnatal depression.

Variables	Prenatal depression			Postnatal depression		
	Crude OR (95% CI)	Adjusted OR (95% CI) <sup>a</sup>	Adjusted OR (95% CI) <sup>b</sup>	Crude OR (95% CI)	Adjusted OR (95% CI) <sup>a</sup>	Adjusted OR (95% CI) <sup>b</sup>
Period of COVID-19 epidemic (in reference to December 31, 2019–January 5, 2020)						
January 13–January 19	0.84 (0.42, 1.66)	0.89 (0.43, 1.84)	0.75 (0.36, 1.56)	0.93 (0.62, 1.40)	0.92 (0.61, 1.39)	0.98 (0.64, 1.50)
January 20–January 26	0.84 (0.36, 1.95)	1.19 (0.46, 3.08)	0.85 (0.35, 2.08)	0.92 (0.57, 1.48)	0.89 (0.55, 1.43)	0.90 (0.55, 1.48)
January 27–February 2	0.92 (0.43, 1.95)	1.01 (0.46, 2.19)	1.06 (0.48, 2.37)	1.67 (1.13, 2.48)*	1.67 (1.12, 2.47)*	1.78 (1.18, 2.68)**
February 3–February 9	0.86 (0.41, 1.82)	0.94 (0.43, 2.07)	1.02 (0.45, 2.31)	2.05 (1.39, 3.03)***	2.03 (1.37, 3.00)***	2.03 (1.35, 3.04)***
February 10–February 16	1.07 (0.54, 2.11)	1.38 (0.68, 2.82)	1.37 (0.65, 2.89)	1.54 (1.08, 2.19)*	1.53 (1.07, 2.19)*	1.48 (1.02, 2.14)*
February 17–February 23	0.71 (0.35, 1.44)	0.77 (0.36, 1.62)	0.77 (0.36, 1.65)	1.71 (1.21, 2.42)**	1.71 (1.20, 2.42)**	1.73 (1.20, 2.48)**
February 24–March 1	0.80 (0.40, 1.63)	0.86 (0.41, 1.79)	0.85 (0.39, 1.83)	1.40 (0.97, 2.02)	1.41 (0.97, 2.04)	1.42 (0.96, 2.09)
March 2–March 8	0.35 (0.18, 0.66)**	0.36 (0.18, 0.71)**	0.39 (0.20, 0.78)**	1.08 (0.68, 1.70)	1.08 (0.69, 1.71)	1.08 (0.67, 1.73)
March 9–March 15	0.34 (0.17, 0.67)**	0.38 (0.19, 0.79)**	0.35 (0.17, 0.73)**	0.95 (0.58, 1.54)	0.93 (0.57, 1.52)	0.90 (0.54, 1.50)
March 16–March 22	0.44 (0.24, 0.83)*	0.49 (0.25, 0.95)*	0.48 (0.25, 0.94)*	1.24 (0.58, 2.64)	1.18 (0.55, 2.53)	1.27 (0.58, 2.79)

<sup>a</sup>Adjusted for sociodemographic variables including age, ethnicity, education, Hukou, family income, delivery status, gravidity, parity, and gestational age;

<sup>b</sup>Adjusted for sociodemographic and health behavior factors including age, ethnicity, education, Hukou, family income, delivery status, gravidity, parity, gestational age, traumatic delivery experience, sleep quality, smoking, drinking, exercise, and family function.

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .

vs. 37.26%,  $p < 0.0001$ ). The majority of participants (90.67%) reported good family functions, and those reporting poor or fair family functions had significantly higher depression prevalence.

**Table 3** and **Supplementary Table 3** show the dynamic changes of exposures and depression levels of participants. The depression prevalence in the participants was significantly different during several time intervals throughout the COVID-19 pandemic.

**Table 4** shows the results of the logistic regression model for the effects of the COVID-19 pandemic on perinatal depression. Compared to the 1st week (December 31, 2019–January 12, 2020) of the pandemic, the prenatal depression risk was significantly decreased during the 3 week period starting from March 2, 2020 (1st week: OR = 0.39, 95% CI: 0.20, 0.78; 2nd week: OR = 0.35, 95% CI: 0.17, 0.73; and 3rd week: OR = 0.48, 95% CI: 0.25, 0.94), whereas the postnatal depression risk significantly rose during the 4 weeks between January 27 and February 23, 2020 (1st week: OR = 1.78, 95% CI: 1.18, 2.68; 2nd week: OR = 2.03, 95% CI: 1.35, 3.04; 3rd week: OR = 1.48, 95% CI: 1.02, 2.14; and 4th week: OR = 1.73, 95% CI: 1.20, 2.48).

## DISCUSSION

In this study, the prevalence rate of perinatal depression was reported among the hospitalized pregnant women exposed to the COVID-19 pandemic in Wuhan. The prevalence of perinatal depression per week ranged from 23.85 to 42.98%. The overall prevalence of perinatal depression was higher in low- and middle-income countries (19–25%), than that in developed countries (7–15%) (26, 27). It should be noticed that a population-based participant enrolment method was adopted in other studies, whereas a hospital-based method was used in our study. Participants enrolled using the different methods possibly

differ in general characteristics, and hence differ in perinatal depression risk. Moreover, the participants had just experienced or were about to experience a delivery, which might cause an increased risk of perinatal depression for them.

The prevalence of prenatal depression was at a high level during the COVID-19 pandemic in Wuhan. Okagbue et al. performed a review study of 26 articles, observing that the prevalence of EPDS-evaluated prenatal depression was 23.8% in pregnant women in their third trimester (28). Huang et al. conducted a cross-sectional survey of 320 pregnant women in their second and third trimesters in Wuhan, reporting a depression prevalence of 29.06% (29). Another study reported that prenatal depression prevalence ranged from 22.10 to 31.94% in Shiyan City, Hubei Province (30, 31). The prenatal depression prevalence in this study was higher than Western China (14.2%) and lower than Eastern China (34.9–36.8%) (32–35).

These results are a warning that the COVID-19 pandemic may possibly bring negative mental impacts to pregnant women all over the world. Controlling for sociodemographic and health behavior variables, the risk of prenatal depression decreased during the period of March 2–22, 2020 compared with the counterpart value at the beginning of the pandemic (December 31, 2019–12 January 12, 2020). The obscure and confusing public information about the pandemic during January 6–12, 2020 may have contributed to the high prenatal depression prevalence in this period. The first report of COVID-19 was published on December 31, 2019; however, the official announcement of the human-to-human transmission of COVID-19 did not occur until January 20, 2020. With implementations of public health measures against the pandemic, including isolation, quarantine, social distancing, and community containment, etc., the daily reported number of new onsets continued to decline, which was smaller than 200 per day after March 1, 2020 (18). This achievement in the prevention and control of the pandemic may

be a reason for the decreased prenatal depression prevalence during that period. Flowers et al. studied the biopsychosocial effect of influenza pandemics, showing that pregnant women were vulnerable to a sense of pressure concerning influenza pandemics and death from influenza (36). As a negative and stressful life event, the COVID-19 pandemic probably increased mental depression. It was found that negative life events during pregnancy were associated with increased depression in the third trimester (37–39). The previous SARS outbreak which caused an international public health crisis, has been proven to have had adverse effects on people's mental health, especially in the severely affected areas (40, 41). Otherwise, the Wuhan city quarantine measure started on January 23, 2020 may also have increased postnatal psychological pressure.

This study is the first to reveal the prevalence of perinatal depression in individuals exposed to the COVID-19 pandemic. Some limitations of the study should be noted. First, as a cross-sectional study, it was not able to confirm a causal relationship between the COVID-19 pandemic and depression risks. Second, we enrolled generally healthy prenatal and postnatal women without SARS-CoV-2 infection in this study. And all participants were from a single maternity institution located in the seriously affected area (with respect to the number of COVID-19 cases). Prudence is needed to extend the research conclusions to those SARS-CoV-2 infected individuals and other areas. Third, the study was hospital-based, which possibly resulted in the limited representability of participants and hence limited the extensionality of our conclusions. Fourth, this study included only the inpatient participants recruited in perinatal periods. The mental health effects of exposures in the first and second trimesters still need to be studied in the COVID-19 pandemic.

During the COVID-19 pandemic, intervention measures against perinatal depression are crucial for the well-being of new mothers and babies. The dynamic change of perinatal depression was associated with COVID-19 pandemic progression among the maternal women studied. An elevated risk of postnatal depression was also observed during the COVID-19 pandemic.

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## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of Hubei Maternal and Child Health Care Hospital. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

GS: design, data collection, and manuscript editing. QW: data collection, data interpretation, and literature search. YC: manuscript draft, design, data collection, and data analysis. YL, RL, LY, and XL: data collection, data interpretation, and manuscript review. MP, HW, and XY: data collection, manuscript review, and visualization. WR and HY: data collection, data validation, and manuscript revision. All of the authors gave final approval of the version to be submitted, and agree to be accountable for all aspects of the work.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2020.551812/full#supplementary-material>

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# Children Coping, Contextual Risk and Their Interplay During the COVID-19 Pandemic: A Spanish Case

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The COVID-19 pandemic has changed the lives of millions of people around the globe and some of the unprecedented emerged disruptions, are likely to have been particularly challenging for young children (e.g., school closures, social distancing measures, movement restrictions). Studying the impact of such extraordinary circumstances on their well-being is crucial to identify processes leading to risk and resilience. To better understand how Spanish children have adapted to the stressful disruptions resulting from the pandemic outbreak, we examined the effects of child coping and its interactions with contextual stressors (pandemic and family related) on child adjustment, incorporating in our analysis a developmental perspective. Data was collected in April 2020, through parent-reports, during the acute phase of the pandemic and, temporarily coinciding with the mandatory national quarantine period imposed by the Spanish Government. A sample of 1,123 Spanish children (50% girls) aged 3 to 12 (Mage = 7.26; SD = 2.39) participated in the study. Results showed differences in the use of specific strategies by children in different age groups (i.e., 3–6, 7–9 and 10–12-year-olds). Despite the uncontrollable nature of the pandemic-related stressors, child disengagement coping was distinctively associated to negative outcomes (i.e., higher levels of behavioral and emotional difficulties), whereas engagement coping predicted psychosocial adjustment across all age groups. Moreover, interactively with child coping, parent fear of the future and parent dispositional resilience appear as relevant contextual factors to predict both negative and positive outcomes, but their effects seem to be age dependent, suggesting a higher contextual vulnerability for younger children. These findings might have implications for identifying individual and contextual risk and informing potential preventive interventions aimed to reduce the impact of future pandemic outbreaks on children of different ages.

**Keywords:** children coping, pandemic, COVID-19-related stressors, adjustment, parent resilience

## INTRODUCTION

The global crisis originated by the recent COVID-19 pandemic is not comparable, neither in magnitude nor in kind, to any other similar experienced before (e.g., SARS- outbreak, Prime et al., 2020). It is unprecedented as, for the first time, we are exposed to a considerable number of unfamiliar stressors (e.g., social distancing, restriction of movement; Yan, 2020), acutely emerged,

but timely sustained by public preventive health measures imposed world-wide (i.e., mandatory home confinement). The psychological long-term effects of these measures remain, currently, largely unknown (Brooks et al., 2020; Green, 2020).

Children, too, have been exposed to these and other aged-related specific stressors (e.g., school closures and online homeschooling, *The Lancet Child Adolescent Health*, 2020). Only recently, some empirical evidence relative to the negative effects on children adjustment is beginning to be gathered from studies conducted, mainly, in affected developed countries. Altogether, these preliminary findings point out to an increased risk of experiencing negative consequences such as depressive and anxiety symptoms (Xie et al., 2020) and changes in emotional states and behaviors (e.g., difficulty concentrating, boredom, irritability, Orgilés et al., 2020). However, at this point, the literature on the impact of COVID-19 pandemic on children psychosocial well-being is still very scarce and the insights from previous pandemic experiences quite limited (Koller et al., 2010; Murray, 2010; Sprang and Silman, 2015).

At the same time, there is enough evidence from developmental, preventive and clinical literature suggesting that children's adjustment to these extraordinary social disruptions is likely to be multi-determined by individual and environmental factors, whose effects might contribute to short and long-term adaptation (Compas, 2006; Grant et al., 2006; Luthar, 2006; Cicchetti, 2010; Blair and Raver, 2012).

First, the ability to effectively cope with the stressful situation, that is to "mobilize, modulate, manage, and coordinate the own behavior, emotions and attention under stress" (p. 6, Skinner and Zimmer-Gembeck, 2009), has been consistently associated to child adjustment in diverse difficult circumstances and at different ages (Smith et al., 2006; Cicchetti and Rogosch, 2009; Zimmer-Gembeck and Skinner, 2011a; Terranova et al., 2015). In children coping research, at a broader level, engagement and disengagement coping (i.e., oriented toward or away the source of stress and/or one's emotions and thoughts) are distinctively associated to different outcomes (Compas et al., 2001). However, these associations seem to be dependent on the controllable or uncontrollable nature of the stressful events (Altschuler and Ruble, 1989; Compas et al., 1991; Clarke, 2006; Wadsworth, 2015). For instance, under controllable stressful conditions, engagement coping is predictive of lower levels of internalizing and externalizing symptoms, whereas disengagement coping, on the contrary, contributes to higher levels of these difficulties (Connor-Smith et al., 2000). However, an avoidant-distractive coping was linked to less negative emotions and short-term maladjustment when children must deal, respectively, with uncontrollable medical stressors (Band and Weisz, 1988) and family marital conflict (O'Brien et al., 1995). Interestingly, there is also evidence suggesting that emotional disengagement (i.e., attempting to eliminate subjective feelings and outward signs of emotion) is a useful short-term strategy for regulating negative emotion (Rice et al., 2007). Applying an engaged-oriented coping to uncontrollable conditions, could increase psychological distress due to the inefficacy of these strategies to modify the objective stressful conditions or maximize one goodness of fit with them as they are (Yeo et al., 2014). Hence, these findings are,

because of the very nature of the current widespread pandemic, of much relevance.

In addition, distal and proximal contextual influences can independently affect child adjustment but also moderate the coping-outcomes relationship (Compas, 2009; Main et al., 2011). Globally, despite individual differences at micro-level contexts, children and their families were exposed, world-wide, to mild-moderate levels of stress resulting from potentially experiencing multiple and unique COVID-19-related stressors. Beyond the domain of individual physical health and psychological well-being (e.g., COVID-19 contagion, Guo et al., 2020), the economic capacity and financial security (e.g., job loss, Baker et al., 2020) and family dynamics (e.g., parent-child relation, Cluver et al., 2020; Prime et al., 2020) were also unexpectedly and profoundly altered. Thus, the way in which parents respond to these disruptive experiences is also essential to define the impact of COVID-19 crisis on children, as for it directly influences not only the youngsters' response to normative stressors (Kliewer et al., 1996) but also to extremely challenging conditions (e.g., natural disasters, war; Bradley, 2007). Modeling processes are one of the core mechanisms through which parents contribute to children's response to stress (Power, 2004). In fact, a positive model of coping, along with the exposure to mild-moderate stress levels and an age-appropriate scaffolding are necessary conditions for the children to develop a healthy repertoire of coping skills (Wadsworth, 2015). Thus, it is likely to be the case that a relatively stable and consistent parental disposition to resist adverse circumstances (i.e., trait resilience, Almedom and Glandon, 2007; Connor and Davidson, 2003) would affect the children capacity to cope under adverse conditions. Moreover, besides these vicarious influences, the use of ineffective coping strategies could also directly undermine parent individual well-being and consequently affect child well-being, by damaging the parent-child relation during the COVID-19 pandemic (Prime et al., 2020). For these reasons, the current scenario offers a unique opportunity to study these interactive coping-context relations and the moderator effect of distal and immediate contextual factors on coping-outcomes relation.

Finally, along with these environmental transactions, children's ability to successfully cope with adverse and stressful conditions is primarily shaped and constrained by their cognitive and emotional development (Skinner and Zimmer-Gembeck, 2009). Child developmentally determined skills and capacities account not only for the differences in the type of coping strategies displayed by children in different age groups but also for the age-dependent normative shifts occurring at certain points (Skinner and Zimmer-Gembeck, 2016a). In fact, their progressive acquisition explains the quantitative and qualitative normative changes in the development of coping occurring during critical transitions (e.g., in infancy to toddlerhood, between ages 5–7 or in late childhood to early adolescence, Skinner and Zimmer-Gembeck, 2007). However, despite the wide recognition of this need to adopt a developmental perspective in the study of children coping, and the evidence supporting the feasibility of its empirical examination even at very early ages (i.e., preschool years, Yeo et al., 2014), these developmental considerations have been rarely incorporated

**TABLE 1 |** Descriptive statistics of the CONFIA-20 study sample: COVID-19-related stressors, demographics variables of participating parents, children and family relevant domains.

	Total (N = 1123)	Range
Person filling the questionnaire: Mother, N (%)	1004 (89.5%)	
<b>COVID-19 crisis related stressors</b>		
Number of days of confinement, M (SD)	30.57 (6.47)	0–60
Number of people during confinement, M (SD)	3.89 (1.01)	1–10
House dimensions in square meters, M (SD)	126.68 (93.98)	35–1600
House with garden: Yes, N (%)	567 (50.7)	0–1
COVID-19 contagion in close circle (family, friends), N (%)	187 (16.7)	0–1
COVID-19 related death in close circle (family, friends), N (%)	59 (5.3)	0–1
Perceived economic impact on the family, M (SD)	1.36 (1.00)	0–3
Negative influence of confinement on family relations, M (SD)	0.80 (0.78)	0–3
<b>Families</b>		
Geographic area of residency: Galicia, N (%)	899 (94.2)	–
Number of children per family, M (SD)	1.78 (0.69)	1–5
Parent perceived level of monthly income, N (%)		
Serious problems making ends meet	20 (1.8)	0–1
Difficulties making ends meet	90 (8.1)	0–1
Tightly making ends meet	483 (43.2)	0–1
Loosely making ends meet	524 (46.9)	0–1
SES, M (SD)	0.09 (0.7)	–2.6 to 1.3
Mother educational level, N (%)		
Doctoral or Master's Degree	85 (7.6)	0–1
Undergraduate	608 (54.3)	0–1
Secondary school	333 (29.8)	0–1
Primary school	90 (8)	0–1
Mother current employment situation (mother-reported), N (%)		
Regular attendance	180 (18)	0–1
Work from home	319 (31.9)	0–1
Paralyzed working activity	195 (19.5)	0–1
Lost job due to COVID-19 crisis	25 (2.5)	0–1
Unemployed before the COVID-19 crisis	142 (14.2)	0–1
Father educational level, N (%)		
Doctoral or Master's Degree	54 (4.9)	0–1
Undergraduate	381 (34.7)	0–1
Secondary school	437 (39.8)	0–1
Primary school	214 (19.5)	0–1
Father current employment situation (father-reported), N (%)		
Regular attendance	18 (16.2)	0–1
Work from home	58 (52.3)	0–1
Paralyzed working activity	18 (16.2)	0–1
Lost job due to COVID-19 crisis	1 (0.9)	0–1
Unemployed before the COVID-19 crisis	6 (5.4)	0–1
Optimal household resources (computer, wi-fi) for the children to do their schoolwork at home, M (SD)	2.84 (1.19)	0–4
<b>Children</b>		
Female, N (%)	551 (50)	0–1
Age, M (SD)	7.26 (2.4)	3–12
Medical or psychological difficulty: Yes, N (%)	141 (12.6)	0–1
Specific psychological difficulties		
TDAH, N (%)	25 (2.2)	0–1
TEA/Asperger, N (%)	12 (1.1)	0–1
Global adjustment to online home schooling, M (SD)	2.22 (1.1)	0–4
<b>Parent difficulties derived from COVID-19 crisis</b>		
Perceived level of stress, M (SD)	1.57 (0.79)	0–3
Reported fear of the future, M (SD)	1.78 (0.85)	0–3
Difficulties to reconcile working and family life M (SD)	2.27 (1.28)	0–4
Difficulties helping children with their academic tasks, M (SD)	2.91 (1.08)	0–4
Anxiety, M (SD)*	2.64 (0.71)	0–4
Depression, M (SD)*	2.39 (0.73)	0–4

Items from the PHQ (Kroenke et al., 2009) were rated on a 5 point comparative scale from 0 ("much less") to 4 ("much more") aiming to represent the change self-perceived in the emotional state as a result of the COVID-19 crisis.

into the empirical research (Compas et al., 2001; Skinner and Zimmer-Gembeck, 2007, 2009).

The main goal of this study is to examine how child coping, unique contextual conditions and parent dispositional resilience, might contribute to the children psychosocial adjustment during the extraordinary context of COVID-19 pandemic, incorporating in our analysis a developmental perspective. Specifically, we aimed (1) to explore the use of specific strategies and broad dimensions of coping by children of different age-groups (2) to determine the positive and negative outcomes of child engagement and disengagement coping under uncontrollable circumstances, (3) to examine to which extent the relation between coping and outcomes is moderated by situational stressors specifically related to the current crisis, (4) to analyze if contextual factors within the family system (i.e., parental resilience) also moderate the coping-outcomes relation and finally (5) to test if these effects are age-dependent. We hypothesized, based on the literature reviewed, that the main coping strategies and dimensions used by children would differ between age groups. Also, the associations of engagement and disengagement coping with child adjustment might be different to the often observed under controllable stressful situations, but distal and proximal contextual factors would moderate the coping-outcomes relation anyhow. Finally, these moderation effects could be age dependent.

## MATERIALS AND METHODS

### Participants

Data for the current research is from the CONFIA-20 Study (*Confinement Effects on Families and Children*), which was aimed to examine the psychological, emotional and behavioral effects of home-confinement in children and families from the region of Galicia, NW Spain. It was conducted in April 2020, during the acute phase of COVID-19 pandemic, temporarily coinciding with the mandatory national quarantine period imposed to the whole population by the Spanish Government from March 13th to April 26th of 2020. Children and families considered to participate in this study had to live in Spain. Despite Galicia being the primary geographical area of interest, families from other Spanish regions were allowed to participate. Families from other countries and/or continents were excluded. Also, parents had to fill the questionnaire strictly within the temporal limits of the national quarantine period, that is, never after April 27th of 2020. Finally, the “target-child” to whom the questionnaire was referred to, could not be younger than three or older than twelve years old. The sample of 1,123 children (50% girls) aged 3–12 ( $M_{age} = 7.26$ ;  $SD = 2.39$ ) was composed by 481 preschoolers (aged 3–6;  $M_{age} = 4.95$ ;  $SD = 0.93$ ; 50.6% girls), 393 middle-aged children (aged 7–9;  $M_{age} = 7.98$ ;  $SD = 0.83$ ; 51.3% girls) and 248 early adolescents (aged 10–12;  $M_{age} = 10.62$ ;  $SD = 0.67$ ; 48.8% girls), when divided by meaningful age subgroups. Data collected was parent-reported (89.5% mothers) and most of the participating families were from Galicia (94.2%) with the remaining 5.8% from other Spanish regions (e.g., Madrid, Ciudad Real, Barcelona, Cantabria, Zamora). Most of the parents were working before

the crisis (86.9%) and, at the time of data collection, almost a half of them (46.9%) declared no difficulties making ends meet. Among those previously employed, they globally maintained their jobs (17.9% kept attending, 33.9% kept working from home, 19.1% were on temporary stoppages, 8.6% were on a medical leave), whereas 2.4% of them lost their employment due to the COVID-19 crisis. At the time of data collection, families had been 30.87 ( $SD = 6.37$ ) days confined, at homes of around 126.68 square meters (ranging from 35 to 1,600; 50.7% of them with garden), with about four people per home ( $M = 3.90$ ,  $SD = 1.01$ ). Finally, 16.7% of the participating parents reported the existence of COVID-19 contagion cases in their close social circle (i.e., family and friends) and 5.3% of them informed of close COVID-19 related deaths (for a detailed characterization of the sample see **Table 1**).

### Procedure

This study was conducted within the context of a large ongoing research, focused on studying child behavioral, emotional and social early development, and was approved by the Bioethics Committee of the University of Santiago de Compostela. We first developed a parent-reported questionnaire to be filled on an online secure platform. Then, we initiated a dissemination strategy by providing information of the study objectives and access to the survey link through (1) the official research group web page, (2) social media (3) telematic contacts with schools and parents associations and (4) informal diffusion actions. Data collection began at April 8th and ended at April 27th of 2020. Participation was anonymous and voluntary. Before filling the survey, parents gave their consent by explicitly agreeing to participate in the study. They were asked to refer their answers strictly to the COVID-19 situation crisis. The duration of the survey was around 15 min and participating families did not receive any reward or compensation.

### Measures and Instruments

**Child Coping.** We assessed context-specific coping on a parent-reported 22-item scale specifically developed for the CONFIA-20 study. After reviewing the available literature (Blount et al., 2008; Pfefferbaum et al., 2012), we selected, translated and adapted items from well-known children coping measures to be appropriate and relevant in content for the COVID-19 pandemic situation. We included items from the KidCOPE (13 items, Spirito et al., 1988) and The Children’s Coping Strategies Checklist (6 items, Ayers et al., 1996), plus 3 more *ad hoc* created items. Then, we grouped them into two broad categories (engagement and disengagement coping) on a conceptual basis, following the model of Connor-Smith et al. (2000). The resulting final scale was composed by two 11-item subscales assessing strategies such as “tries to calm him/herself” or “spontaneously proposes possible solutions to current crisis” (engagement coping) and “avoids thinking of the current situation” or “remains without doing anything because thinks that the current crisis cannot be solved” (disengagement coping). Parents rated the items on a 4-point Likert scale ranging from 0 (“never”) to 3 (“always or almost always”). The internal consistency of the engagement and disengagement scales was acceptable ( $\alpha = 0.77$



and  $\alpha = 0.66$ , respectively). For further information about the specific items selected, see **Supplementary Table 1**.

**Child Maladjustment during the COVID-19 Pandemic.** We selected three subscales of the Strengths and Difficulties Questionnaire (SDQ, Goodman, 1997) to assess the negative consequences of COVID-19 crisis in child behavioral and emotional functioning. Specifically, conduct problems, hyperactive behaviors and emotional problems subscales. Examples of items selected are, respectively, “often has temper tantrums or hot tempers,” “is constantly fidgeting or squirming” or “is often unhappy, down-hearted or tearful.” The original 4-point scale response was adapted to a 5-point comparative format (0: much less, 1: some less, 2: no change, 3 some more, 4: much more), aiming to reflect the possible observed changes on child behavior compared to the pre-COVID-19 pandemic functioning. The internal consistency of the scales was acceptable ( $\alpha = 0.81$ ,  $\alpha = 0.61$  and  $\alpha = 0.77$ , respectively).

**Child Adjustment during the COVID-19 Pandemic.** We assessed the potential positive outcomes resulting from the pandemic crisis on a parent-reported 14-item scale specifically developed *ad hoc* for the CONFIA-20 study (see Romero et al., 2020 for further information about the scale). The four scales are routine maintenance (4 items; e.g., “he/she has adapted him/herself to a scheduled daily activity routine;  $\alpha = 0.55$ ), prosocial involvement (5 items; e.g., “shows interest to spare time with family”;  $\alpha = 0.70$ ), social-oriented reflection (3 items; e.g., “he/she assumes that we all should collaborate to slow down the pandemic”;  $\alpha = 0.84$ ), and social bonding (2 items; e.g., “keeps contact with his/her beloved ones who are not close, by phone, internet...”;  $\alpha = 0.48$ ). Parents rated each item on the same 5-point comparative scale used to assess negative outcomes.

**COVID-19 related Stressors.** *Ad hoc* items were created to assess CONFIA-20 participant parents’ experiences with COVID-19 related stressors. For the purposes of the current research, we have exclusively focused on health, financial and future-threatening acute stressors. They were assessed through single parent-reported items such as “I think that the COVID-19 crisis has damaged the economic situation of my family” or “the current crisis makes me fear the future” rated on a 4-point scale from 0 (“not at all”) to 3 (“very much”). Also, Yes/No independent questions asking for the existence of any COVID-19 related contagion and/or death on the social close circle were included. In case of an affirmative answer, parents were asked to detail the number of close contagions and/or deaths.

**Parent Resilience.** We used the 10-item version of the Connor-Davidson Resilience Scale (CD-RISC-10, Connor and Davidson, 2003; Campbell-Sills and Stein, 2007) to measure parental dispositional resilience. Items such as “I am able to adapt when changes occur,” “having to cope with stress can make me stronger” or “I try to see their humorous side when I am faced with problems” were rated by parents on a 4-point Likert scale ranging from 0 (“not at all”) to 4 (“true nearly all the time”). The CD-RISC-10 has been used in various samples (Wang et al., 2010; Notario-Pacheco et al., 2011) and in different cultures (Lauridsen et al., 2017) showing high reliability across studies. The internal consistency of the scale in our sample was excellent ( $\alpha = 0.90$ ).

**Covariates.** We included an assessment of family socioeconomic status (SES), which was derived from questions about (1) parent education, (2) family income, and (3) family financial solvency to face daily overheads. Education level was computed as the mean of mother and father ratings on a six-point scale ranging from 1 (“without basic studies”) to 6 (“postgraduate”). Family income was based on parents’ reports of family income rated on a four-point scale from 1 (“serious problems making ends meet”) to 4 (“well off”). A composite SES was computed by first transforming the aforementioned variables into z-scores. Finally, we included child gender (0 = male, 1 = female) and age in years as covariates.

## Analytic Strategy

We first computed the descriptive statistics of the CONFIA-20 study sample, including the means, standard deviations and frequencies of COVID-19-related stressors, demographic variables of parents and children, and family relevant domains. We then ran an analysis of variance to compare the mean differences in broad dimensions of coping (engagement and disengagement) and fine-grained coping strategies by age groups (i.e., preschoolers, aged 3–6, children aged 7–9 and early adolescents, aged 10–12). Before the regression analyses, we explored the bivariate correlations between the study variables. All the above-mentioned analyses were conducted on SPSS Statistics version 26 (IBM Corp, 2019). Finally, on Mplus vs. 8.0 (Muthén and Muthén, 2019) we conducted multiple linear regression analysis to model the main effects of child coping on adjustment, controlling for other relevant variables such as sociodemographic covariates (i.e., sex, age, SES), COVID-19 related stressors (i.e., close contagion, close death, economic impact, fear of the future) and parental resilience. In the subsequent regression models, we included the interaction terms of the context-specific coping, with the contextual factors, to examine their potential moderating effects on the coping-outcomes relation. As it was hypothesized that these main and interactive associations could be age-dependent, complementary regression analysis, were conducted separately by age group subsamples.

## RESULTS

### Age Differences in Coping

Overall, the context-specific coping of the CONFIA-20 children during the COVID-19 crisis was more engagement than disengagement-oriented (**Table 2**). In fact, a significant increase in the use of engagement strategies was found at the end of the preschool period. When analyzing the specific strategies used by the different age group subsamples (i.e., 3–6-year-olds, 7–9-year-olds and 10–12-year-olds) significant differences were found. Compared to older children, preschoolers tended to use more predominantly strategies such as “yelling or getting angry” (negative emotion regulation). Seven to nine year olds, however, seemed to start to display more engaged-oriented strategies such as “trying to do specific actions to solve the current crisis” (problem solving), “trying to understand how things like this

**TABLE 2 |** Total sample means and mean differences in broad dimensions of coping and specific coping strategies between children of different age groups.

CONFIA-20 Coping Scale items (Subscale)	Total sample <i>M</i> ( <i>SD</i> )	Age group 1 (3–6-year-olds) <i>M</i> ( <i>SD</i> )	Age group 2 (7–9-year-olds) <i>M</i> ( <i>SD</i> )	Age group 3 (10–12-year-olds) <i>M</i> ( <i>SD</i> )	Group differences <i>F</i> ( <i>df</i> )	<i>p</i>	Post hoc comparisons
1. Seems to try to forget what is happening (DIS)	1.13 (0.96)	1.14 (0.99)	1.13 (1.00)	1.12 (0.85)	<i>F</i> (2,1116) = 0.40	0.963	–
2. Tries to hold a positive view of the situation (ENG)	1.83 (0.91)	1.87 (0.93)	1.82 (0.88)	1.77 (0.91)	<i>F</i> (2,1117) = 1.04	0.353	–
3. Prefers to spend time alone (DIS)	0.62 (0.64)	0.51 (0.62)	0.61 (0.61)	0.84 (0.68)	<i>F</i> (2,1118) = 22.32	0.000	Sig: 1-2; 2-3
4. Blames someone for causing the current crisis (DIS)	0.25 (0.60)	0.24 (0.57)	0.24 (0.60)	0.30 (0.64)	<i>F</i> (2,1116) = 0.99	0.371	–
5. Spontaneously proposes possible solutions to current crisis (ENG)	0.80 (0.72)	0.79 (0.69)	0.87 (0.74)	0.73 (0.72)	<i>F</i> (2,1116) = 2.80	0.061	–
6. Yells or gets angry (DIS)	1.03 (0.73)	1.18 (0.73)	0.94 (0.69)	0.90 (0.70)	<i>F</i> (2,1118) = 17.87	0.000	Sig: 1-2; 1-3
7. Wishes the COVID-19 crisis had never happened (DIS)	1.71 (1.08)	1.59 (1.11)	1.80 (0.1.01)	1.83 (1.07)	<i>F</i> (2,1112) = 5.97	0.003	Sig: 1-2; 1-3
8. Spends time with other people (e.g., family members) (ENG)	1.95 (0.95)	1.97 (1.01)	1.99 (0.88)	1.84 (0.93)	<i>F</i> (2,1111) = 2.07	0.127	–
9. Does things (e.g., play or watch TV) to evade him/herself (DIS)	1.90 (0.95)	1.88 (0.99)	1.88 (0.92)	1.93 (0.89)	<i>F</i> (2,1112) = 0.27	0.759	–
10. Avoids talking about the COVID-19 pandemic (DIS)	0.77 (0.95)	0.75 (0.95)	0.74 (0.95)	0.86 (0.96)	<i>F</i> (2,1112) = 1.22	0.294	–
11. Tries to do specific actions to solve the current crisis (ENG)	0.99 (0.79)	0.89 (0.77)	1.07 (0.79)	1.03 (0.80)	<i>F</i> (2,1110) = 5.87	0.003	Sig: 1-2
12. Tries to calm him/herself (ENG)	1.00 (0.89)	0.91 (0.86)	1.04 (0.88)	1.13 (0.91)	<i>F</i> (2,1106) = 5.15	0.006	Sig: 1-3
13. Wishes something could be done to change the situation (DIS)	1.18 (0.94)	1.09 (0.95)	1.25 (0.91)	1.22 (0.94)	<i>F</i> (2,1108) = 3.48	0.031	Sig: 1-2
14. Remains without doing nothing (the situation can't be solved) (DIS)	0.57 (0.87)	0.55 (0.88)	0.56 (0.84)	0.61 (0.88)	<i>F</i> (2,1102) = 0.42	0.657	–
15. Shares with us how she/he feels regarding the crisis (ENG)	1.16 (0.79)	1.09 (0.78)	1.21 (0.79)	1.22 (0.77)	<i>F</i> (2,1086) = 3.54	0.029	Sig: 1-3
16. Tries to understand how things like this happens (ENG)	1.36 (0.89)	1.28 (0.88)	1.42 (0.89)	1.44 (0.89)	<i>F</i> (2,1115) = 4.00	0.019	Sig: 1-2
17. Makes jokes or tries to laugh about the current situation (ENG)	0.75 (0.80)	0.66 (0.76)	0.79 (0.83)	0.85 (0.80)	<i>F</i> (2,1115) = 5.50	0.004	Sig: 1-3
18. Seeks help in others to understand what is happening (ENG)	1.27 (0.83)	1.28 (0.84)	1.29 (0.83)	1.22 (0.81)	<i>F</i> (2,1116) = 0.56	0.570	–
19. Reminds him/herself that his/her situation is not that bad (ENG)	1.41 (0.98)	1.27 (1.02)	1.51 (0.95)	1.53 (0.91)	<i>F</i> (2,1103) = 8.87	0.000	Sig: 1-2; 1-3
20. Avoids thinking about the current crisis (DIS)	1.11 (0.89)	1.06 (0.93)	1.14 (0.89)	1.13 (0.83)	<i>F</i> (2,1103) = 0.90	0.408	–
21. Seeks help to try to improve the situation (ENG)	0.96 (0.79)	0.09 (0.81)	1.07 (0.81)	0.92 (0.72)	<i>F</i> (2,1105) = 5.30	0.005	Sig: 1-2
22. Fantasizes with a prompt resolution for the current crisis (DIS)	1.50 (0.92)	1.55 (0.91)	1.47 (0.95)	1.43 (0.89)	<i>F</i> (2,1112) = 1.60	0.203	–
Engagement (ENG) coping strategies	1.23 (0.46)	1.17 (0.45)	1.28 (0.46)	1.24 (0.47)	<i>F</i> (2,1118) = 5.60	0.004	Sig: 1-2
Disengagement (DIS) coping strategies	1.07 (0.43)	1.05 (0.43)	1.07 (0.42)	1.10 (0.43)	<i>F</i> (2,1118) = 1.49	0.226	–

ENG, Engagement coping subscale; DIS, Disengagement coping subscale. Age group 1 (3–6-year-olds), *N* = 481; Age group 2 (7–9-year-olds), *N* = 393; Age group 2 (10–12-year-olds), *N* = 248. Post-hoc comparisons (Bonferroni's): only the groups between which the differences are significant are indicated.

happens”(seeking understanding) or “seeking help to try to improve the situation” (instrumental social support). Finally, early adolescents repertoire of behavioral and cognitive coping skills becomes not only more diverse [e.g., “ making jokes or trying to laugh about the current situation” (humor) and “wishing it never had happened” (wishful thinking)] but also sustained in more complex regulatory capacities (e.g., “trying to calm him/herself,” positive emotion regulation).

### Correlations Between the Study Variables

In the full sample, child’s age was positively related to favorable outcomes (e.g., reflection and social bonding) and negatively related to conduct problems and hyperactive behaviors (Table 3). An older age was also positively related to engagement coping.

Engagement and disengagement coping were positively and modestly correlated and, as expected, indicators of adjustment and maladjustment were negatively correlated to each other.

High significant positive correlations among indicators of maladjustment (i.e., conduct problems, hyperactive behaviors and emotional problems) were found, along with moderate positive correlations with child disengagement coping. Similarly, significant positive correlations between indicators of adjustment (i.e., routine maintenance, prosocial involvement, social-oriented reflection, social bonding), with slightly lower magnitudes, were found, along with moderate positive correlations with child engagement coping.

Some of the COVID-19-related stressors (i.e., close death, economic impact, and particularly fear of the future) were positively correlated with disengagement coping. On the

contrary, dispositional resilience, was negatively correlated with child disengagement and positively correlated with child engagement coping.

Finally, a higher family socioeconomic status was negatively correlated with COVID-19 perceived economic impact, self-reported parent fear of the future and child disengagement coping. Perceived high economic impact was positively and moderately correlated to self-reported parent fear of the future.

### Which Are the Associations Between Broad Dimensions of Child Coping and Behavioral, Emotional and Social Outcomes During the COVID-19 Pandemic?

Child disengagement coping was distinctively and similarly associated to negative outcomes, including both externalizing - conduct problems and hyperactive behaviors - and internalizing problems- emotional difficulties (Table 4). However, the effects of engagement and disengagement coping, yet opposites in direction, were similar in magnitude for conduct problems. Child engagement coping was distinctively and extensively associated to indicators of adjustment, and, particularly to social-oriented reflection. These associations were significant even when controlling for other covariates whose contribution is assumed to be relevant in the prediction of the variables of interest (i.e., sex, age, family SES, contextual stressors related to COVID-19 crisis and parental resilience).

Additionally, as regards of the main effects of the contextual factors, the existence of a close contagion and a higher parent-perceived economic impact of the COVID-19 crisis on

**TABLE 3 |** Correlation matrix and descriptive statistics of the study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age																
2. SES	-0.03															
3. Close contagion	-0.02	0.06														
4. Close death	-0.04	0.01	0.29***													
5. Economic impact	0.02	-0.39***	0.04	0.04												
6. Fear of the future	-0.02	-0.24***	0.00	-0.04	0.35***											
7. Parental Resilience	-0.02	0.13***	-0.02	-0.01	-0.09*	-0.29***										
8. Engagement	0.08*	0.06*	0.01	-0.03	0.07*	0.06	0.19***									
9. Disengagement	0.05	-0.19***	0.04	0.06*	0.18***	0.35***	-0.20***	0.17***								
10. Conduct problems	-0.18***	-0.03	0.08*	0.04	0.09*	0.14***	-0.20***	-0.19***	0.27***							
11. Hyper. behaviors	-0.17***	-0.09*	0.09*	0.05	0.09*	0.17***	-0.21***	-0.13***	0.29***	0.68***						
12. Emot. problems	-0.03	-0.01	0.06*	0.03	0.04	0.13***	-0.18***	-0.09*	0.27***	0.62***	0.61***					
13. Rout. maintenance	0.03	0.08*	0.00	-0.02	-0.08*	-0.07*	0.25***	0.27***	-0.11***	-0.33***	-0.31***	-0.24***				
14. Social or. reflect.	0.22***	0.02	-0.04	0.01	0.01	0.06*	0.10*	0.34***	0.07*	-0.05	0.05	0.07*	32***			
15. Prosocial involve.	0.00	0.04	0.01	0.01	-0.01	0.05	0.21***	0.28***	0.06*	-0.17***	-0.03	-0.06*	0.32***	0.47***		
16. Social bonding	14***	0.04	-0.3	-0.02	0.00	0.03	0.10*	0.19***	0.05	-0.10*	-0.04	-0.02	0.30***	0.32***	0.32***	
Mean	7.26	0.09	-	-	1.36	1.78	2.52	1.23	1.07	2.29	2.37	2.22	2.05	2.78	2.57	2.52
SD	2.38	0.75	-	-	1.00	0.85	0.68	0.46	0.42	0.70	0.50	0.61	0.54	0.65	0.60	0.96
N	1123	1093	1122	1121	1120	1119	1067	1120	1120	1120	1120	1120	1075	1069	1073	1083
Range	3-12	-2.6 to 1.3	0-1	0-1	0-3	0-3	0-4	0-2.7	0-2.3	0-4	0.2-3.8	0-4	0-4	0.7-4	0-4	0-4

\*p = 0.05, \*\*p = 0.01, \*\*\*p = 0.001.

**TABLE 4 |** Results of multiple regression analysis showing associations between broad dimensions of children coping and behavioral, emotional and social functioning during the COVID-19 pandemic.

Predictors	Negative outcomes					Positive outcomes						
	Conduct problems	Hyperactive behaviors	Emotional problems	Routine maintenance	Social-oriented reflection	Prosocial involvement	Social bonding	B (SE)	β	B (SE)	β	
Sex	-0.05 (0.01)	-0.07 (0.03)	0.00 (0.03)	0.00 (0.03)	0.05 (0.04)	0.05 (0.04)	0.09*	0.04	0.05 (0.04)	0.05	0.16 (0.06)	0.09*
Age	-0.07 (0.04)	-0.03 (0.01)	-0.01 (0.01)	0.00 (0.01)	0.02 (0.01)	0.05 (0.01)	0.02	0.19***	-0.01 (0.01)	-0.02	0.05 (0.01)	0.13***
SES	0.08 (0.03)	0.00 (0.02)	0.07 (0.03)	-0.01 (0.03)	0.08*	0.01 (0.03)	-0.01	0.01	0.03 (0.03)	0.00	0.05 (0.04)	0.04
<b>COVID-19 stressors</b>												
Close contagion	0.13 (0.06)	0.11 (0.04)	0.08 (0.03)	0.01 (0.04)	0.05	-0.09 (0.05)	0.01	-0.05	0.00 (0.05)	0.00	-0.10 (0.08)	-0.04
Close death	-0.06 (0.01)	0.01 (0.08)	-0.04 (0.10)	-0.02 (0.08)	-0.01	0.14 (0.09)	-0.01	0.05	0.08 (0.08)	0.03	-0.01 (0.14)	0.00
Economic impact	0.05 (0.02)	0.02 (0.02)	0.01 (0.02)	-0.05 (0.02)	0.02	-0.02 (0.02)	-0.09*	-0.03	-0.03 (0.02)	-0.04	-0.01 (0.03)	-0.01
Fear of the future	0.01 (0.03)	0.02 (0.02)	0.03 (0.02)	0.03 (0.02)	0.04	0.07 (0.03)	0.05	0.09*	0.06 (0.02)	0.09*	0.07 (0.04)	0.06
<b>Parent resilience</b>												
Trait resilience	-0.09 (0.03)	-0.08 (0.02)	-0.08 (0.03)	0.16 (0.03)	-0.09*	0.07 (0.03)	0.20***	0.07*	0.16 (0.03)	0.18***	0.11 (0.05)	0.06*
<b>Child coping</b>												
Engagement	-0.34 (0.05)	-0.16 (0.03)	-0.17 (0.04)	0.29 (0.04)	-0.12***	0.44 (0.04)	0.25***	0.31***	0.31 (0.04)	0.24***	0.32 (0.07)	0.15***
Disengagement	0.47 (0.05)	0.33 (0.04)	0.39 (0.04)	-0.15 (0.03)	0.28***	0.00 (0.05)	-0.12***	0.00	0.05 (0.05)	0.04	0.08 (0.08)	0.04
F <sup>2</sup>	0.20***	0.18***	0.12*	0.16***	0.12*	0.15***	0.16***	0.15***	0.11*	0.11*	0.08	0.8*

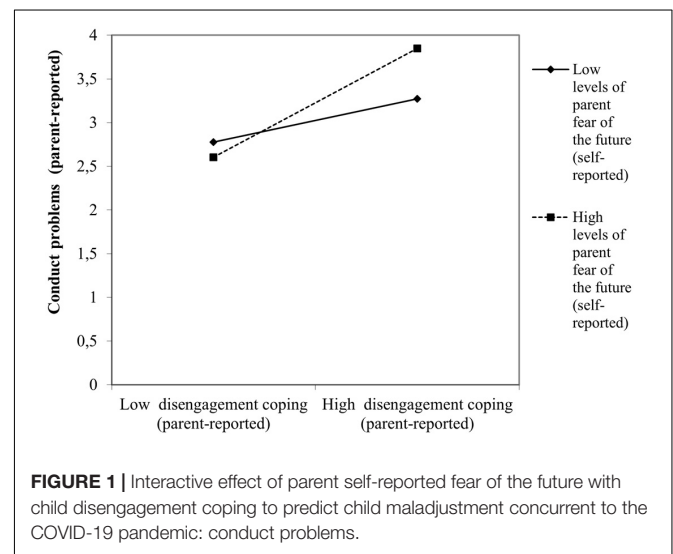
\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . These results are derived from the total sample. They were replicated by age group subsamples in complementary analysis (3–6-year-olds, 7–9-year-olds and 10–12-year-olds). We modeled pathways from all covariates (age, sex, and SES) to all other predictors in the regression models. Main predictors were mean centered before entered into the equation.

family, were positively and significantly associated to higher levels of externalizing behaviors such as conduct problems and hyperactive behaviors. On the contrary, higher levels of parent self-reported fear of the future were positively and significantly associated to adaptative outcomes such as higher levels of social-oriented reflection and prosocial involvement. Similarly, parental resilience was positively related to positive outcomes across all the models exploring adjustment, particularly to children's routine maintenance and prosocial involvement with others during the COVID-19 crisis.

### Which Are the Contextual Characteristics Interacting With Child Coping to Predict Outcomes During the COVID-19 Pandemic?

On the basis of the results previously obtained, after having modeled the main effects of child coping on different indicators of adjustment, we created interaction terms between child disengagement coping and contextual factors to specifically predict negative outcomes, and engagement coping and contextual factors to specifically predict positive outcomes (see **Supplementary Table 2**).

When interaction terms were introduced in the regression models, most of the situational stressors analyzed did not interact with children coping to predict either maladjustment or adjustment. Only parent perceived fear of the future interacted with child disengagement and engagement coping tendencies to predict negative and positive consequences, respectively. For instance, higher levels of parent perceived fear of the future predicted higher levels of child behavioral ( $\beta = 0.13, p < 0.04$ , **Figure 1**) and emotional problems ( $\beta = 0.14, p < 0.03$ ) when children displayed disengagement coping. On the contrary, higher levels of parent perceived fear of the future predicted higher levels of child social-oriented reflection ( $\beta = 0.17, p < 0.03$ ) when the children coping style was engaged-oriented (**Figure 2**).



**FIGURE 1 |** Interactive effect of parent self-reported fear of the future with child disengagement coping to predict child maladjustment concurrent to the COVID-19 pandemic: conduct problems.



## Does Parental Dispositional Resilience Interact With Child Broad Dimensions of Coping to Predict Outcomes During the COVID-19 Pandemic?

Similar to what was done for other contextual factors and based on the results previously obtained, we created interaction terms between child disengagement and engagement coping with parental resilience to specifically, and respectively, predict negative and positive outcomes (see **Supplementary Table 3**).

There was an interactive effect of parental dispositional resilience with child situational coping for the prediction of both negative and positive outcomes resulting from the COVID-19 crisis. Specifically, lower levels of parent resilience interact with high levels of child disengagement coping to produce higher levels of emotional problems ( $\beta = -0.07, p < 0.02$ , **Figure 3**). Conversely, higher levels of parent resilience enhance the child prosocial attitude toward others during the COVID-19

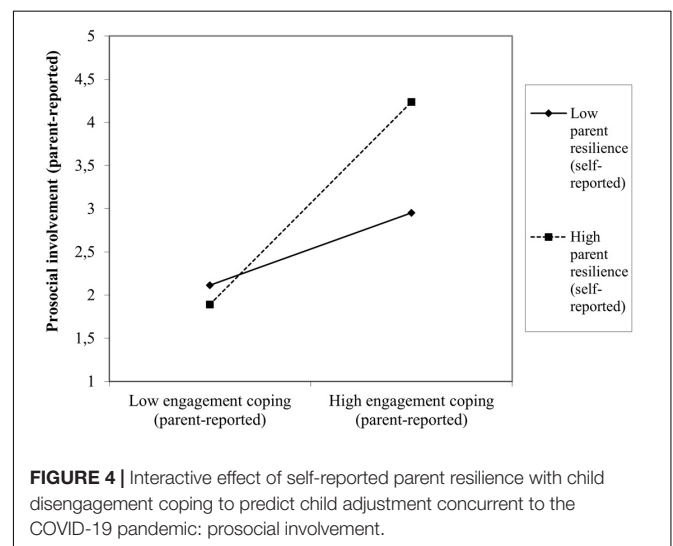
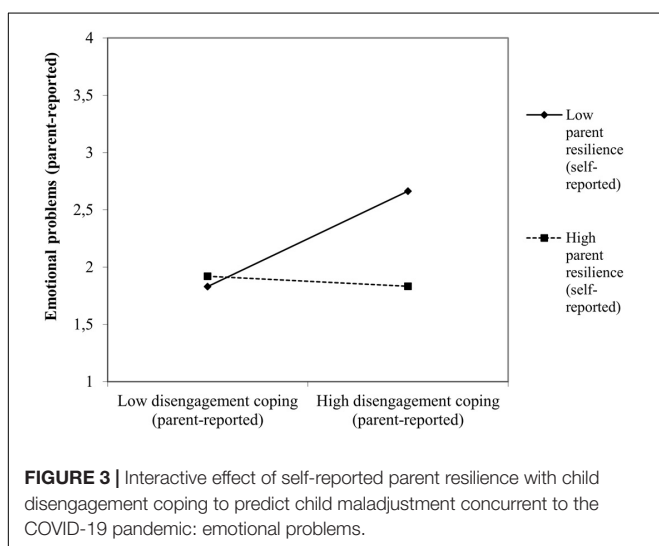
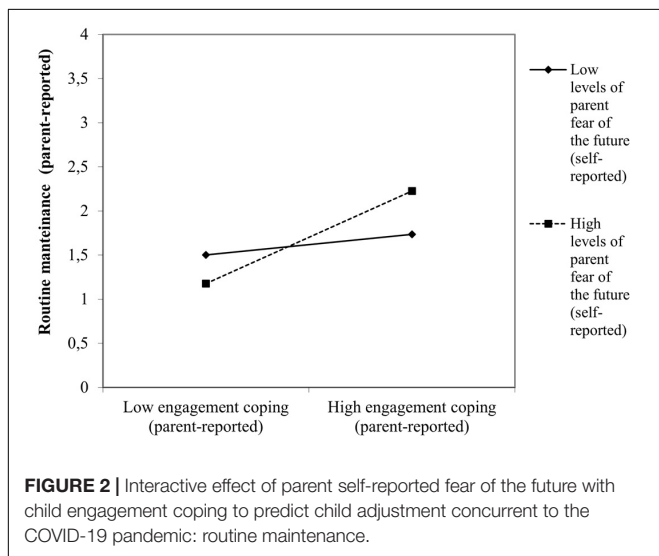
crisis when they tend to use approach-oriented coping strategies ( $\beta = 0.10, p < 0.001$ , **Figure 4**).

## Are the Main and Interactive Effects Found Age-Dependent?

To test if the main and interactive effects of interest varied in function of age, we run the same previous models by age group subsamples in complementary analysis, addressing the preschool period, middle childhood and early adolescence (see **Supplementary Tables 4, 5**). Overall, the findings pertaining the main effects of coping remained unaltered, but some age-determined differences emerged when analyzing the contextual interactions by age-group.

First, for all three age groups, disengagement coping strategies predicted higher levels of conduct problems, hyperactive behaviors and emotional problems (**Supplementary Table 4**). On the contrary, for all the three age groups, engagement coping was associated to a better behavioral and psychosocial adjustment (routine maintenance, prosocial involvement, social-oriented reflection and social bonding (**Supplementary Table 5**).

However, the moderator effects of contextual stressors on the child coping-outcomes relation were slightly different in function of the age group considered to predict both negative and positive outcomes. Only preschoolers, but not older children (i.e., above 7 years of age) were particularly vulnerable to experience behavioral ( $\beta = 0.21, p < 0.02$ ) and emotional difficulties ( $\beta = 0.22, p < 0.01$ ) when displaying a disengagement coping style in the context of a higher parent self-reported fear of the future. At the same time higher parent self-reported fear of the future also positively influenced the routine maintenance ( $\beta = 0.23, p < 0.02$ ) of young engaged-oriented children but not their older counterparts (i.e., above 9-year-olds). For 7–9-year-old children, however, the existence of a COVID-19 contagion in the close social circle was the stressor whose interaction with a disengagement coping was significantly associated to a poorer emotional functioning ( $\beta = 0.11, p < 0.05$ ). Finally, for early adolescents (i.e., 10–12-year-olds) none of the situational



stressors analyzed interacted with disengagement or engagement tendencies to produce particular outcomes.

Similarly, the moderator effects of the parental dispositional resilience on the child coping-outcomes relation were slightly different by age group subsamples, fundamentally when predicting negative outcomes. Only preschoolers seemed particularly vulnerable to the effect of low levels of parent resilience. Specifically, lower levels of parent self-reported resilience interacted with high levels of disengagement coping to produce higher levels of conduct problems ( $\beta = -0.08$ ,  $p < 0.02$ ), hyperactive behaviors ( $\beta = -0.09$ ,  $p < 0.007$ ) and emotional problems ( $\beta = -0.12$ ,  $p < 0.001$ ) in children aged 3–6. Interestingly, for 7–9-year-old children, lower levels of parent-self reported resilience interact with high levels of child engagement coping to predict higher levels of child social-oriented reflection ( $\beta = -0.13$ ,  $p < 0.006$ ).

## DISCUSSION

Our main goal was to examine how child coping, unique contextual conditions and parent resilience, might contribute to children's psychosocial adjustment during the COVID-19 pandemic, incorporating in our analysis a developmental perspective. Consistent with our hypothesis, the psychological impact of the pandemic on children well-being, might be variable, depending on individual and situational characteristics, which would serve, independently and through person by context interactions, as risk or protective factors for children adjustment to these circumstances.

We first studied the main effects of child context-specific coping on psychosocial well-being. Interestingly, our findings show that, disengagement coping is associated to negative outcomes, whereas engagement coping would be predictive of concurrent child psychosocial adjustment during the pandemic. Contrary to what would be expected due to the uncontrollable nature of the stressful situation, child disengagement coping distinctively accounted for negative outcomes, both externalizing and internalizing, and this pattern of findings was replicated in all of three age levels in complementary age-group analysis, suggesting that this association might emerge early in preschool years and remain significant across early development. Thus, our results are in line with other findings from preschool samples examining normative uncontrollable developmental stressors (e.g., night fears, Chalmers et al., 2011), but clearly diverge from the main line of findings pertaining youth populations, testing the effects of other normative uncontrollable stressors (e.g., medical procedures, parental conflict, Band and Weisz, 1988; Altshuler and Ruble, 1989; O'Brien et al., 1995). In adult literature, however, there is evidence suggesting that avoidant coping in the context of a pandemic (e.g., SARS) is predictive of higher levels of psychological symptoms (Main et al., 2011). Unsurprisingly, certain tendency of younger children to rely more prominently on disengagement coping strategies during the current pandemic would be expected. Similarly, the use of these type of strategies by children whose emerging metacognitive capacities allow them to distinguish between controllable and uncontrollable situations

(i.e., children about 7 years old, Altshuler and Ruble, 1989). However, to explain their negative effect on child well-being it might be essential to recall some of their specific functions. Just as some of the disengagement tactics could mitigate the short-term impact of the uncontrollable COVID-19-related stressors (e.g., cognitive and behavioral distraction allowing the redirection of attention from the stressor to an alternative target) others (e.g., partial or complete avoidance), might prevent children from detecting, appraising and dealing with the current crisis in more potential adaptive ways (e.g., reminding him/herself that his/her situation is not that bad), exacerbating the behavioral and emotional negative consequences of the stressors (Compas et al., 2001; Skinner and Zimmer-Gembeck, 2016c).

As expected, we found a moderator effect of contextual factors on the relation between child coping and adjustment. However, remarkably, this effect was only significant for parent self-reported fear of the future and not any of the other contextual factors examined (i.e., close COVID-19 contagion and/or death, and perceived economic impact of the health crisis). This finding is subjected to different, yet complementary, interpretations. First, rather than solely by the experiencing of "objective stressors" in their close social circle, children's coping and adjustment processes seem to be more dependent on "subjective-like factors" exerting their influence from the proximity of their *immediate* socialization circle, in a developmental period in which, contrarily to others (e.g., adolescence) parental influences on child coping responses are more prominent (Kliewer et al., 1996; Skinner and Zimmer-Gembeck, 2016b). Second, the moderator effect of these stressors could be only properly examined if the potential confounding effect of children's knowledge about the circumstances (e.g., does she/he know about the close contagion?) was controlled in our study. It might be the case that these pandemic-related stressors do not have a significant effect on child engagement and disengagement coping strategies to produce specific outcomes, simply due to the absence of children's explicit knowledge about them. In any case, our findings suggest that high levels of parental fear of the future do have a moderator effect on child coping-outcomes relation. In fact, this effect might be described as paradoxical, as higher levels of parental fear of the future could serve as both a risk or protective factor for child psychosocial well-being, depending on which type of child coping they interact with (disengagement and engagement, respectively). This might be partially explained by the sense of threat and the uncertainty that COVID-19 pandemic has caused (Peters et al., 2017). Despite we have adaptive mechanisms that allow us to successfully navigate the inherent uncertainties of life (e.g., the reliance on past experiences when trying to anticipate future events, Grupe and Nitschke, 2013), they are very likely to be insufficient and their beneficial effects limited, when we must function under highly stressful situations such as the current COVID-19 pandemic (Wang et al., 2020). In these conditions, we are forcedly and abruptly confronted with high levels of uncertainty about a seemingly uncontrollable and unpredictable imminent future (Pfefferbaum and North, 2020). Because of this uncertainty, even as diffuse or tangible as the threat might be (Baker et al., 2020), our anxiety levels could increase because our perceived

capacity of anticipation is diminished (Grupe and Nitschke, 2013). Thus, in this scenario, parent fear of the future would act as an amplifier of the child disengagement coping negative effect on child emotional and behavioral adjustment. Yet, at the same time, and interactively with child engagement coping, it could exert a protective effect, by functioning as a trigger to initiate compensatory processes aimed to restore a certain sense of predictability and controllability, through simple actions directed to maintain daily routines during the pandemic home-confinement. Essentially, these findings are explicitly confirming not only the importance of contextual risk (Main et al., 2011), but also the important role of the individual differences in coping. Ultimately, the consequences of high levels of the same contextual stressor (i.e., fear of the future) depend on the type of coping on which they operate.

Similarly, and supporting our hypothesis, parental resilience also exerts a moderator effect on child coping-outcomes relation. In fact, our findings suggest that both risk and resilience to maladjustment can result from these interactive processes. The parental personality trait of resistance to adversity (i.e., resilience, Bensimon, 2012) interacts with child engagement and disengagement coping to produce positive or negative outcomes. First, low levels of parent resilience could serve as a risk factor for emotional difficulties at high, but not low levels of child disengagement coping. Therefore, consistent with classical hypothesis, our results suggest that this differential effect of parental resilience seems uniquely determinant in the presence of high, but not low levels of risk (Stattin et al., 1997). Second, a similar, yet less strong effect, is found when parental resilience operates along with child engagement tendencies, as its positive effect is clearly strong for higher levels of child engagement coping compared to lower levels. Interestingly, high levels of engagement and resilience coming together or, conversely, high levels of disengagement and low of resilience combined, might be the reflection of the underneath similarities between child and parent coping resulting from socialization processes (Kliwer et al., 1996) which remain on course during the pandemic. Thus, a parental dispositional adaptive coping would be essential to explain not only the concurrent level of child adjustment to the COVID-19 crisis, but also to understand how children cope the way they do under these conditions (Abaied et al., 2010; Cappa et al., 2011; Skinner and Zimmer-Gembeck, 2016b). In fact, despite being an atypical and non-normative scenario, the pandemic is still an opportunity for parents and children to advance in the coping socialization tasks.

Altogether, these findings reinforce, on the basis of a systemic theory, the interdependence principle, as the functioning of one family member impacts the others and vice versa (Carr, 2015). Moreover, systems theory could serve as a useful framework to integrate these findings, by signaling concrete channels (e.g., parent resilience) through which broader contextual risk (e.g., economic pressure on especially vulnerable families) negatively affect individual family members (e.g., child adjustment, Prime et al., 2020).

Finally, as hypothesized, interesting age-group differences emerged in our complementary analysis. As coping is both

a reflection and a contribution to development (Zimmer-Gembeck and Skinner, 2011b), children age influences not only the distinctive strategies they use, but also the vulnerabilities that might lead them to short-term negative outcomes within the context of the pandemic. Undoubtedly, COVID-19 crisis has immersed children into an environment of unprecedented challenging demands, likely to be particularly overwhelming for younger ones (Fegert et al., 2020; Green, 2020). Hence, as our findings show, the higher vulnerability of preschoolers to distal and proximal contextual risk is not surprising. For instance, consistent with the idea that the parent-child interpersonal coping systems are initially coregulated, it is reasonable that young children depend on external sources (e.g., parent trait resilience) for regulation (Skinner and Zimmer-Gembeck, 2007). Conversely, as our findings suggest, older children' permeability to the influence of COVID-19 related stressors could be lower in favor of a prominent role of their individual resources (i.e., coping skills), as a consequence of their behavioral and cognitive coping skills becoming more diverse and complex in nature as they grow.

Considering the current predictions about likely recurrent future COVID-19 breakouts and the lack of any previous similar experiences in our recent history, our findings might provide some insights to guide, at a practical level, the identification of individual and contextual risk, informing tailored preventive interventions aimed to reduce the psychosocial impact of future pandemic recurrences on children of different ages. Certainly, coping-based interventions are inherently a difficult endeavor (Coyne and Racioppo, 2000) and children coping-based interventions might be subjected to additional challenges (Frydenberg et al., 2017). However, there is room for hope. Universal stress management programs have shown positive outcomes for children (e.g., reduced levels of stress and anxiety, Kraag et al., 2009) and schools seem to be feasible settings for their application (Pincus and Friedman, 2004). Moreover, besides children, the beneficial effects of these programs are extensible to their parents (Frydenberg et al., 2014). Consequently, any intent to meaningfully adapt and transfer some of these effective preventive intervention's components to the highly specific context of the COVID-19 pandemic, would be an interesting contribution to the field of children coping research and more importantly, a mighty useful service to children and families during the COVID-19 times.

## Strengths and Limitations

To our knowledge, this is one of the first studies to date, to analyze the coping-outcomes relation within the context of the COVID-19 pandemic. Despite examining the changes derived from the crisis on a large community sample of Spanish home-confined children during the acute phase of the pandemic, using a wide range of adjustment measures, and incorporating a developmentally friendly approach, this research has important methodological limitations.

First, the measures for the coping construct may be limited. As a result of prioritizing a shorten length for the coping measure due to time-cost reasons, the number of items selected might fail to capture the wide variety of strategies used by children of these ages. Also, despite following a theory driven strategy in the

*ad hoc* development of the questionnaire and considering the adequacy of the items to the current crisis for their selection, this procedure has clear limitations. For instance, the content of some items is likely to be age un-appropriated or too abstract to be applicable to young children. For this reasons, empirical difficulties to reach acceptable fit indices in factor/confirmatory analysis and, also, scale-reliability analysis would be expected. Second, some of the subscales used to operationalize child adjustment during the pandemic showed unacceptable levels of internal consistency (e.g., routine maintenance,  $\alpha = 0.55$ ; social bonding,  $\alpha = 0.48$ ). This could be partially explained, in the latter case, by the small number of items composing the scale (i.e., 2 items). Third, data collection relied exclusively on parent reports of observable and non-observable child behavior. Besides the threat of single informant biases, without a multi-informant approach, we lack valuable self-report information, particularly interesting in the case of older children (e.g., early adolescents). Fourth, cross-sectional analyses are only informative of short-term effects, offering a limited view on the true scope and magnitude of the pandemic impact on children. To test if these effects are sustained over time, longitudinal analysis to compare them during versus after quarantine would be needed. Additionally, without a prospective design it is not possible to make causal inferences on coping-outcomes relation or explore possible reciprocal effects. Fifth, relevant pre-COVID-19 child and family predictors accounting for child functioning during the current crisis were not included in our analysis (e.g., serious family economic hardships). Sixth, the cumulative effects of concurrent additional stressors to the COVID-19 crisis were not modeled (e.g., chronic child health condition or domestic violence). Finally, we did not control the presumably important effect of the moment, that is, the specific date, when the data was collected (i.e., at the beginning or the end of the home confinement period).

With more sophisticated and rigorous designs, combining multi-informant and multi-method assessments with a longitudinal approach, future research should necessary address the specific emotional, behavioral and cognitive mechanisms through which children coping during extreme circumstances such the COVID-19 pandemic, exerts its influence to produce specific outcomes. Specifically, a longitudinal follow-up of our study sample, would provide a better picture of how children cope with the long-standing pandemic-related stressors beyond the acute phase examined for this work, providing valuable insights on the mechanisms involved in potential maladaptive courses observed in children with particularly higher levels of vulnerability due to cumulative risk.

## Conclusions

Our findings contribute to better understand how children adapt (or fail to) during the COVID-19 pandemic by highlighting the explanatory value of child context-specific coping, pandemic and family contextual factors and child development level over observed adjustment. Overall, they suggest the need of

combining both child and family components in tailored-preventive interventions aimed to reduce the psychological impact of future pandemic outbreaks, as how children and their parents cope plays a crucial role for their adjustment. Also, they confirm the need to adopt a developmentally sensitive perspective in which aged-graded specifications are considered.

## DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available in a public repository. However, they are expected to be publicly available soon. Until then, they will be available upon request to the corresponding author. Requests to access the datasets should be directed to BD-Á, [beatrizdominguez.alvarez@usc.es](mailto:beatrizdominguez.alvarez@usc.es).

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Bioethics Committee of the Universidade de Santiago de Compostela. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## AUTHOR CONTRIBUTIONS

All authors were involved in the process of data collection. LL-R, JG-F, AI-T, and ER organized and prepared the database for the statistical analysis. BD-Á and JG-F contributed to the conception and design of the study. BD-Á performed the statistical analysis and wrote the manuscript. All authors contributed to the revision of the manuscript and read and approved the submitted version.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.577763/full#supplementary-material>



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# Physical and Psychological Impact of the Phase One Lockdown for COVID-19 on Italians

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The exceptional pandemic due to the 2019 coronavirus disease (COVID-19) has obliged all Italians to stay at home. In the literature, there are evidences that traumatic global events, such as natural catastrophes and pandemic, have negative effects on the physical and psychological health of the population. We carried out a survey to analyze the physical and psychological conditions of Italians during the pandemic. Due to the severe limitations in moving during the phase one lockdown, the survey was administered by internet. Results show that Italians followed the provisions established by the Italian government to avoid contamination, but 43% of them declared to have suffered from physical symptoms, in particular migraine, sleep disorders, persistent exhaustion, and difficulty of concentration. They have great fear to be contaminated or that relatives or friends can be contaminated, and they actively take actions to avoid contamination. Participants declared that they had suffered a lot of inconveniences due to restrictions in their movements, and that their life habits were strongly changed. They spent their time at home in different activities, but their psychological well-being was strongly impaired by the lockdown. The level of anxiety tripled, in relation to the pre-pandemic period, and 30% of males and 41% of females declared to have severe levels of depression. Participants with high levels of optimism and hopefulness show a stronger resilience against anxiety and depression. In addition, there is a negative correlation between anxiety and depression and the five factors of personality. These results show that psychological diseases must not be neglected, and that people in lockdown do need support for their psychological health, also with the help of internet and communication technologies.

**Keywords:** COVID-19, anxiety, depression, resilience, lockdown

## INTRODUCTION

The 2019 coronavirus disease (COVID-19) pandemic is a global event that is causing enormous changes in lifestyles and daily activities of people of every part of the world. In Italy, particularly, the pandemic has caused a high level of deaths among Italian citizens (14.1% of the contaminated population), especially among persons who are over 65 years old. In all the world, there are more than 4.5 million cases of contaminated people with more than 312,000 deaths

[data obtained from the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University on 5 May 2020<sup>1</sup>). On the basis of this high risk for citizens health, the Italian government from 10 March declared the lockdown for all working and social activities (phase one lockdown); the closure of schools, universities, public offices, and private businesses; and the mandatory quarantine for all Italians who were contaminated by the virus. Italians have to stay at home, with the possibility to move outside only in cases of strong necessity, and they have to follow procedures for securing themselves against contamination. In addition, the Italian government reinforced the public medical system to deal with the pandemic. We decided to analyze, with a survey, the impact of the pandemic and of the first phase of the lockdown on the behavior and psychological well-being of people.

There are evidences from the literature that global negative events, such as natural catastrophes, cause physical damages and psychological distress (Janney et al., 1977; Kanno et al., 2013). Also, the pandemic has negative effects on psychological well-being, not only in physicians and medical workers who have to deal with the effects of the pandemic on human beings (Greenberg et al., 2020; Tan et al., 2020) but also in normal people who have to abruptly change their life habits (Wheaton et al., 2012; Sood, 2020). COVID-19 immediately emerged as a dangerous virus for human beings health because of its high level of contamination, and researchers recommended an immediate intervention to

reduce its dangerousness (Wang et al., 2020). By reviewing studies of the psychological impact of previous pandemics [e.g., severe acute respiratory syndrome (SARS), H1N1, or Ebola], Brooks et al. (2020) evidenced that during the pandemic period, people suffer from stress, depression, and anxiety and can develop fears and worries about their economic status. The authors also claim that further research is necessary to analyze the impact of public health measures activated for preventing contamination and the real efficiency of these measures (Brooks et al., 2020). The pandemic can have negative impacts on physical health (Li et al., 2020), but other authors highlighted the strong necessity to study the effects of the pandemic and government restrictions of individual activities on people's psychological health, especially on their level of anxiety and depression (Holmes et al., 2020). Psychological stress, anxiety, and depression have negative impacts not only on human beings but also on the entire society, from both an economic and a political standpoint (Gyani et al., 2013; Layard, 2013).

Italy was the first European country to face the risk of a pandemic on a large scale (Saglietto et al., 2020). The rapid increase of positive cases in the last days of February induced the Italian government to take severe measures that blocked nearly all working and social activities, and these measures could have had a strong impact on Italians' mental health. In particular, the duration of the restrictive measures against free movement, the reduction of social contacts, the fear of possible infections, the shortage of economic resources or supplies, and the lack of clarity in information could have

<sup>1</sup><https://gisanddata.maps.arcgis.com>

**TABLE 1** | Demographic characteristics and distribution of the Italian sample.

Italian regions	%	Professions	%	Marital status	%
Abruzzo	42.82	Peasant, farmer, or fisherman	0.48	Divorced or separated	3.11
Basilicata	1.91	Driver	0.96	Engaged or cohabitant	34.69
Calabria	6.70	Unemployed	8.13	Single	36.84
Campania	9.81	Retailer or shop keeper	2.15	Married	24.88
Emilia-Romagna	1.67	Employee	4.55	Widowed	0.48
Friuli Venezia Giulia	0.48	Teacher or professor	9.57		
Lazio	4.07	Dependent worker	17.46	<b>Education level</b>	<b>%</b>
Liguria	0.24	Seasonal worker	0.96	Primary school	0.72
Lombardia	4.07	Not qualified worker	0.96	Secondary school	5.74
Marche	3.59	Manager or businessman	2.39	High school	53.35
Molise	1.67	Military worker	0.72	University	4.19
Piemonte	0.48	Pensioner	1.91		
Puglia	15.79	Self-employed worker	9.33	<b>Annual familiar income (€)</b>	<b>%</b>
Sardegna	0.72	Student	39.47	<20,000	44.02
Sicilia	0.72	Technician or qualified worker	0.96	From 20,000 to 40,000	38.52
Toscana	2.39			From 40,000 to 60,000	1.29
Trentino-Alto Adige	0.48			From 60,000 to 80,000	2.87
Umbria	0.72			>80,000	4.31
Veneto	0.48				
Missing	1.20				



negatively affected citizens and their psychological well-being (Orrù et al., 2020); thus, methods of prevention for stress and mental health diseases (Marazziti et al., 2020) should be taken into consideration, also by the public authority, to reduce pandemic distress. Therefore, the pandemic can be considered a strong cause of stress for Italian people without any doubts, and it is necessary to estimate the level of psychological disease generated by the pandemic in order to develop the best methods of interventions to contrast its harmful impact on the life of each individual and on the functioning of the entire society. However, empirical data are necessary to evaluate the real physical and psychological conditions of the population.

## MATERIALS AND METHODS

### Sample

The sample was composed of 418 participants (72.97% females). Mean age was 32.23 years ( $SD = 12.46$ ). **Table 1** shows the demographic characteristics of the sample. Even if there were participants of nearly all Italian regions (only Valle d'Aosta was not present), a higher percentage of participants were from the central and southern parts of Italy.

### Materials

The online survey included different questions and psychological questionnaires to collect data about the physical and psychological conditions and the diseases produced by quarantine on participants. In addition, we provided questions about the level of knowledge of COVID-19 and its mechanisms of propagations. Personality traits, anxiety, depression, and resilience of participants were measured with standardized psychological tests.

### Assessment of Participants' Health Status

In the survey, questions were provided to collect information about the health status of participants. We asked if participants were contaminated or believed to have been contaminated by COVID-19, if they were eventually recovered in hospitals, if they suffered from other chronic pathologies (and in case of positive response, which was their pathology), what kind of physical symptoms they suffered in the last 2 weeks, how long was the duration of these symptoms, and if they had relatives or friends recovered from COVID-19.

### Assessment of Participants' Knowledge and Fear About COVID-19

To assess participants' knowledge of COVID-19, a series of questions was used asking participants if they had correct or incorrect notions about COVID-19. For example, a correct notion is that COVID-19 causes respiratory diseases, and an incorrect notion is that it can infect only old people. Participants responded using a Likert scale from 1 (not true) to 4 (totally true). Another series of questions assessed participants'

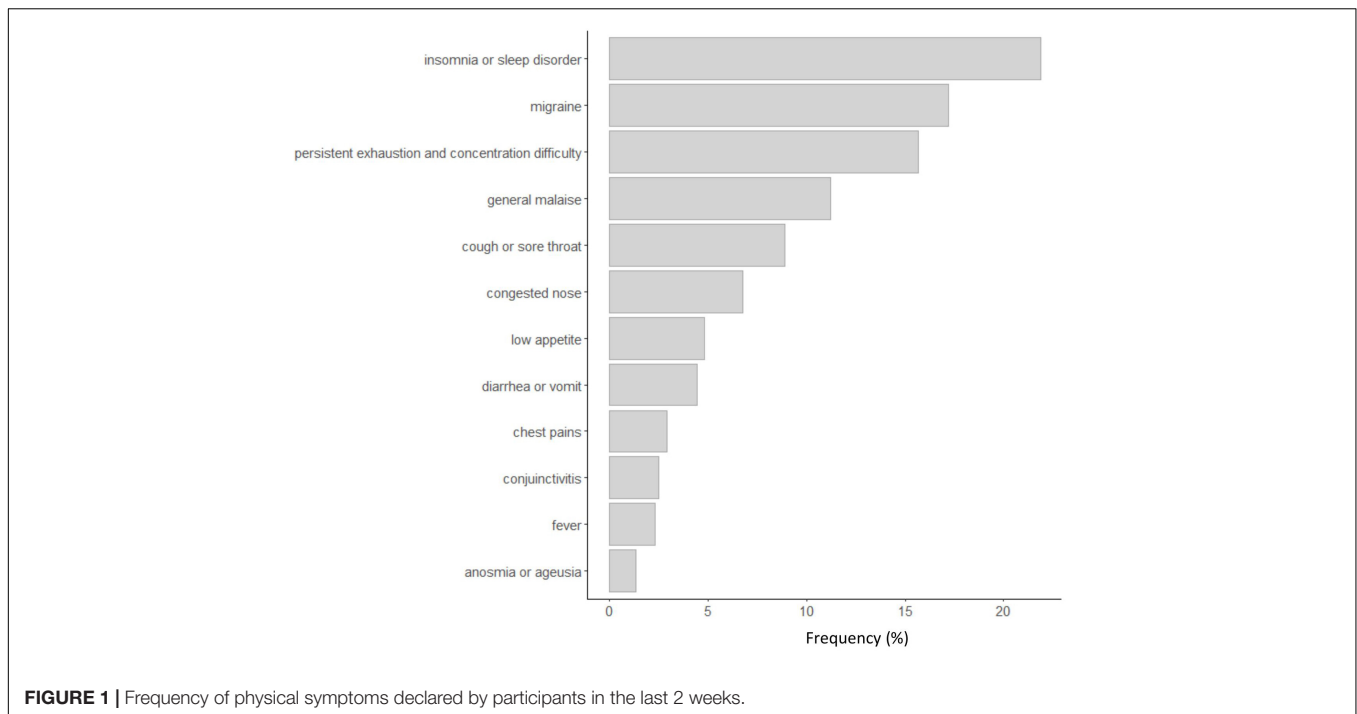
knowledge of the various means of transmission of COVID-19 (e.g., *via* physical contact or fluid contamination). Participants had to evaluate the most probable means of contamination using a Likert scale from 1 (not true) to 4 (totally true). Other questions assessed different kinds of fear about COVID-19 (e.g., to be contaminated or that relatives or friends can be contaminated) using a Likert scale from 1 (no fear) to 4 (highest fear).

### Assessment of Participants' Problems and Behavior During the Lockdown

Participants were asked which were the most important problems they suffered after the movement restrictions due to lockdown or quarantine (e.g., obligation to stay at home or possible economic difficulties) using a Likert scale from 1 (not true) to 4 (totally true). We asked participants to rate the global disease caused by the lockdown (no disease,

**TABLE 2** | Participants' health status.

Do you think to be contaminated by COVID-19?	%
No	95.22
Yes, but I did not make any medical test	4.07
Yes, I made the medical test	0.72
Have you been recovered in a hospital for COVID-19?	%
No	98.99
Yes	1.01
Do you suffer from chronic pathologies (different from COVID-19)?	%
No	91.87
Yes	8.13
Other pathologies	%
Asthma or respiratory disease	19.45
Diabetes	16.68
Inflammatory diseases	13.90
Migraine	11.12
Hypertension	11.11
Thyroid disease	8.34
Cancer	5.56
Renal impairment	5.56
Multiple sclerosis	2.78
Not specified	5.56
Did you suffered from some physical symptoms in the last 2 weeks?	%
No	56.94
Yes	43.06
Symptoms duration	%
From 1 to 3 days	39.18
From 3 to 5 days	23.71
From 5 to 10 days	16.49
More than 10 days	2.62
Did you have relative or friends infected by COVID-19?	%
No	72.01
Yes	20.10
Do not know	7.89



**TABLE 3** | Mean ratings and standard deviation (SD) of participants' scores to assess knowledge and fear about COVID-19 and its means of contamination.

Covid knowledge		Covid fear		Covid means of contamination	
Items	Means (SD)	Items	Means (SD)	Items	Means (SD)
It causes respiratory diseases	3.56 (0.56)	To get seriously ill	2.92 (0.91)	By contact with fluids(e.g., blood)	2.84 (1.03)
It was generated in a laboratory	1.82 (0.89)	My beloved persons got harmed by the virus	3.62 (0.54)	By cough or sneeze	3.67 (0.49)
It was created by a secret agency	1.34 (0.65)	Damages in my profession or work	2.37 (0.98)	By contact with objects or clothings	2.66 (0.86)
It is a banal flu	1.37 (0.61)	Generation of wars or social conflicts	2.59 (0.93)	By air conditioning installations	2.07 (0.94)
It affects only old people	1.57 (0.76)	Impossibility to find a vaccine	2.48 (1.01)	By food	1.55 (0.78)
It can damage everyone	3.63 (0.54)	Impossibility to find valid therapies against the virus	2.58 (0.97)	By domestic animals	1.17 (0.43)
It can kill only people with other illnesses	2.12 (0.83)	The high probability to be contaminated	3.33 (0.71)	By wild animals	1.42 (0.70)
Animals transmitted it to human beings	2.44 (1.12)	High level of virus mutation	3.12 (0.84)		
It can be defeated only with medicines	2.20 (0.98)				

low disease, medium disease, high disease) and how strong was the impact of the lockdown on their life habits (no impact, low impact, medium impact, high impact, total impact). To assess the actions or behaviors participants took on to contrast contamination, we asked if they remained at home and what they did to avoid infection (e.g., if they washed their hands or wore masks when going out). In addition, we asked what kind of activity they were doing during their permanence at home when they were not working (e.g., watching TV or reading books). Other questions were provided to assess if they received social support from family, local institutions, or voluntary associations during the lockdown

("Are you receiving any help from someone or from services and institutions?").

### Assessment of Psychological Conditions

We assessed the personality traits of the five factor model of personality (extraversion, agreeableness, conscientiousness, emotional stability, and openness) using the Big Five Observer (BFO) questionnaire (Caprara et al., 1994). The BFO is composed of 40 items that are a couple of adjectives that define the characteristic of the five traits of personality. Scores were based on a Likert scale from 1 to 7. The higher the score, the higher the presence of the trait. Emotional

stability of the BFO is the inverted measure of neuroticism (Caprara et al., 1994).

We assessed anxiety and depression of participants to have indications of their psychological well-being during the lockdown period. Anxiety was measured using the State Trait Anxiety Inventory (STAI) of Spielberger with 20 items (Spielberger, 1983). Scores were based on a Likert scale from 1 (not at all) to 4 (very much). We used the standardized scores of the Italian population collected for the CBA 2.0 to estimate if participants suffered from a severe level of anxiety (Sanavio, 1997). The global STAI scores corresponding to the 95th percentile were 55 and 61 for males and females, respectively. Depression was assessed using the short form of the Beck Depression Inventory (BDI) with 13 items (Beck and Beck, 1972). The Italian version of the BDI was validated by Sica and Ghisi (2007). Scores ranged from 0 to 3 for each item. Different levels of depression severity were established in relation to range scores (Beck and Beck, 1972; Reynolds and Gould, 1981; Knight, 1984; Stukenberg et al., 1990). Scores from 0 to 4 indicate the absence of depression, from 5 to 7 mild depression, from 8 to 15 moderate depression, and scores higher than 15 indicate severe depression. Participants' resilience was estimated using the Revised Life Orientation Test (LOT-R) scale by Scheier et al. (1994), which measures optimism, and the Hope Herth Index (HHI) scale (Herth, 1992), which measures hopefulness. Resilience is composed of many characteristics or qualities

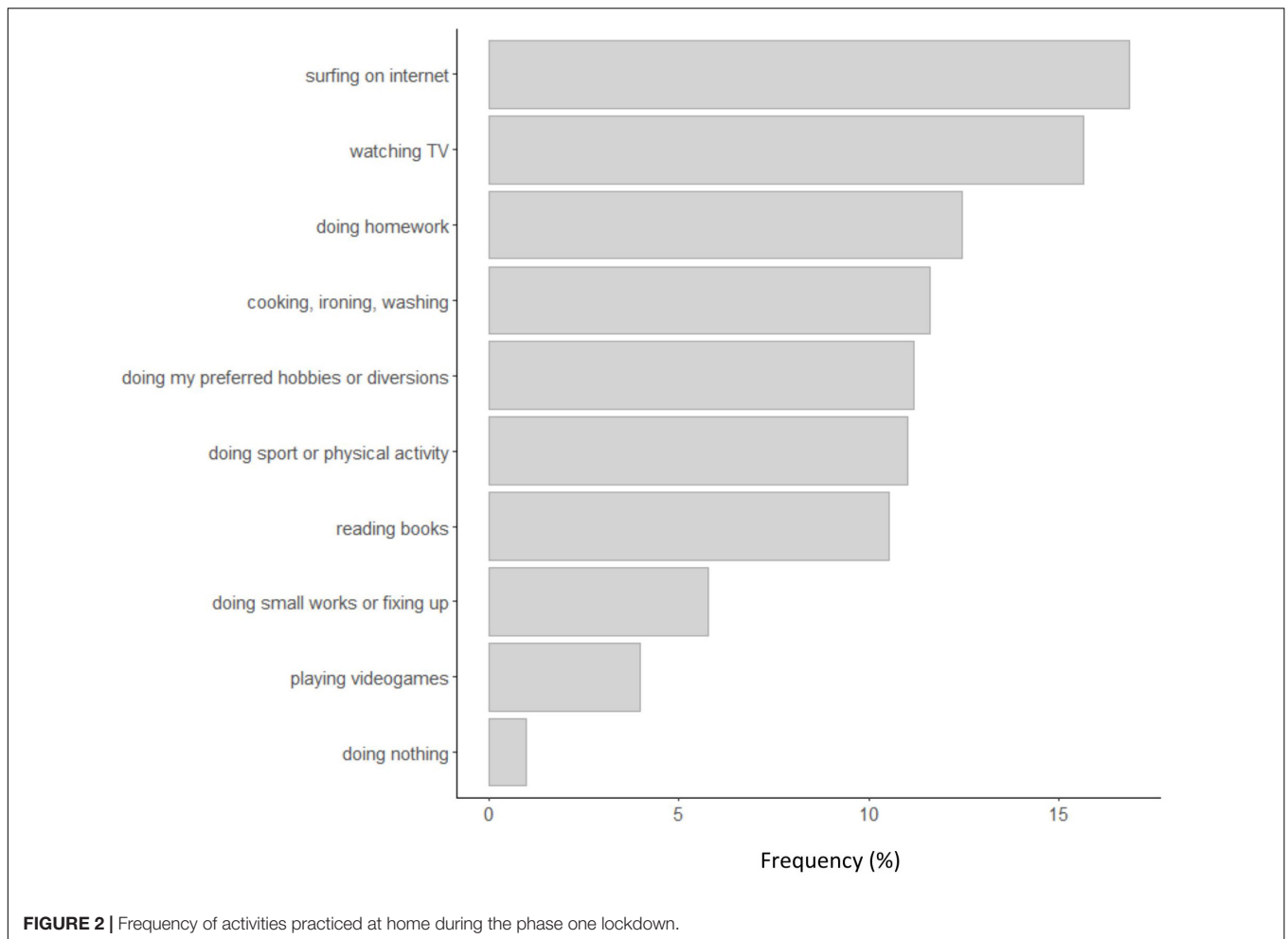
(Richardson, 2002), and among the optimal characteristics indicated in a special issue of the American Psychologist and of the Journal of Social and Clinical Psychology, there are optimism (Peterson, 2000) and hope (Snyder, 2000). We selected optimism and hopefulness because other studies defined them as protective factors against traumas and negative life events (Madsen and Abell, 2010). The LOT-R scale has 10 items, with scores on a Likert scale from 1 (strongly disagree) to 5 (strongly agree), and it measures the level of optimism and faith on positive outcomes in the future. The higher the score, the higher the level of optimism. The Italian standardization of the LOT-R was made by Chiesi et al. (2013). The Italian standardization of the HHI was made by Ripamonti et al. (2012). The scale consists of 12 items with a Likert scale from 1 (strongly disagree) to 4 (strongly agree), and it assesses three dimensions of hopefulness: inner sense of temporality and future, that is the ability to preserve a positive vision of the future (HHI temp); interconnectedness with self and others or subjective beliefs to have a strong interior force and to be not isolated from others (HHI conn); and inner positive readiness and expectancy, that is the ability to react to negative situations and the confidence that our personal actions can improve negative situations (HHI exp). This scale was used particularly for estimating resilience in patients suffering from cancer disease (Ripamonti et al., 2012). In addition, we used the Italian standardized version of the Marlowe–Crowne (MC) scale for social desirability (Manganelli Rattazzi et al., 2000), to check the validity of subjective responses in psychological scales. We used the short form with nine items with a Likert scale from 1 (low social desirability) to 5 (high social desirability). Positive or negative correlations with MC indicate a tendency to over- or underestimate psychological characteristics or traits, respectively.

**TABLE 4 |** Lockdown disease causes, global level of disease, impact of phase one lockdown on normal life, and permanence at home of the sample.

Quarantine disease causes	Means (SD)
Obligation to stay at home	2.84 (0.93)
Impossibility to see relatives and friends	3.36 (0.71)
Impossibility to work	2.48 (1.04)
Reduced physical or sporting activity	2.29 (1.02)
Impossibility to receive adequate health care	2.08 (1.04)
Economic difficulties	2.22 (1.07)
Impossibility to attend schools for children	1.69 (0.95)
Long duration of lockdown	3.26 (0.83)
General disease	%
No disease	5.02
Low disease	35.17
Medium disease	43.30
High disease	16.51
Impact of lockdown on life habits	%
No impact	1.20
Low impact	12.44
Medium impact	36.36
High impact	27.51
Total impact	22.49
Permanence at home	%
I stay always at home	27.03
I get out only for necessity	72.01
I get out as before	0.96

## Procedure

Participants responded by compiling an online survey made with Google modules. The link of the survey was distributed *via* social networks (Facebook and WhatsApp). Participants were contacted through the social networks of the authors of this work and were asked to propagate the link to other relatives or friends. Participants before doing the survey were informed about the aims of the research, and they were given information about the privacy of their data. We followed the Helsinki Declaration of ethical principles for medical research involving human participants, and the study procedure received the approbation of the Department of Medicine and Aging Sciences for its execution. Before compiling the survey, participants had to declare their effective will to participate in the survey. Without this declaration, they could not start the compilation. Participation was voluntary. Because of the possibility to repeat the test, at the end of the survey, we asked participants if they wanted to compile the survey on a successive moment. Data were collected from 8 April to 5 May. Anonymity and privacy of the participants were guaranteed according the Italian and the European laws about privacy (Italian law n. 196/2003 and EU GDPR 679/2016, respectively).



## RESULTS

### Missing Data

The online survey was projected to reduce the risk of missing data. For completing the survey, it was necessary to respond to all items. In addition, some items were activated only when participants declared to possess specific characteristics (e.g., items asking the kind of chronic pathology, if the participant declared it). In this way, we reduced the number of missing data to zero.

### Assessment of Participants' Health Status

**Table 2** shows the participant's health status. Nearly all participants declared not to be contaminated by COVID-19 (>95%). Of the participants, 4% declared that they believed to be contaminated, even if they did not make any medical test, and less than 1% declared to have been effectively contaminated.

Only 1% of participants reported to have been hospitalized for COVID-19. Furthermore, 8.13% of participants suffered from chronic diseases, not related to COVID-19. The most frequent diseases were asthma, diabetes, inflammatory diseases, migraine, hypertension, and thyroid disease. In addition, 43% of

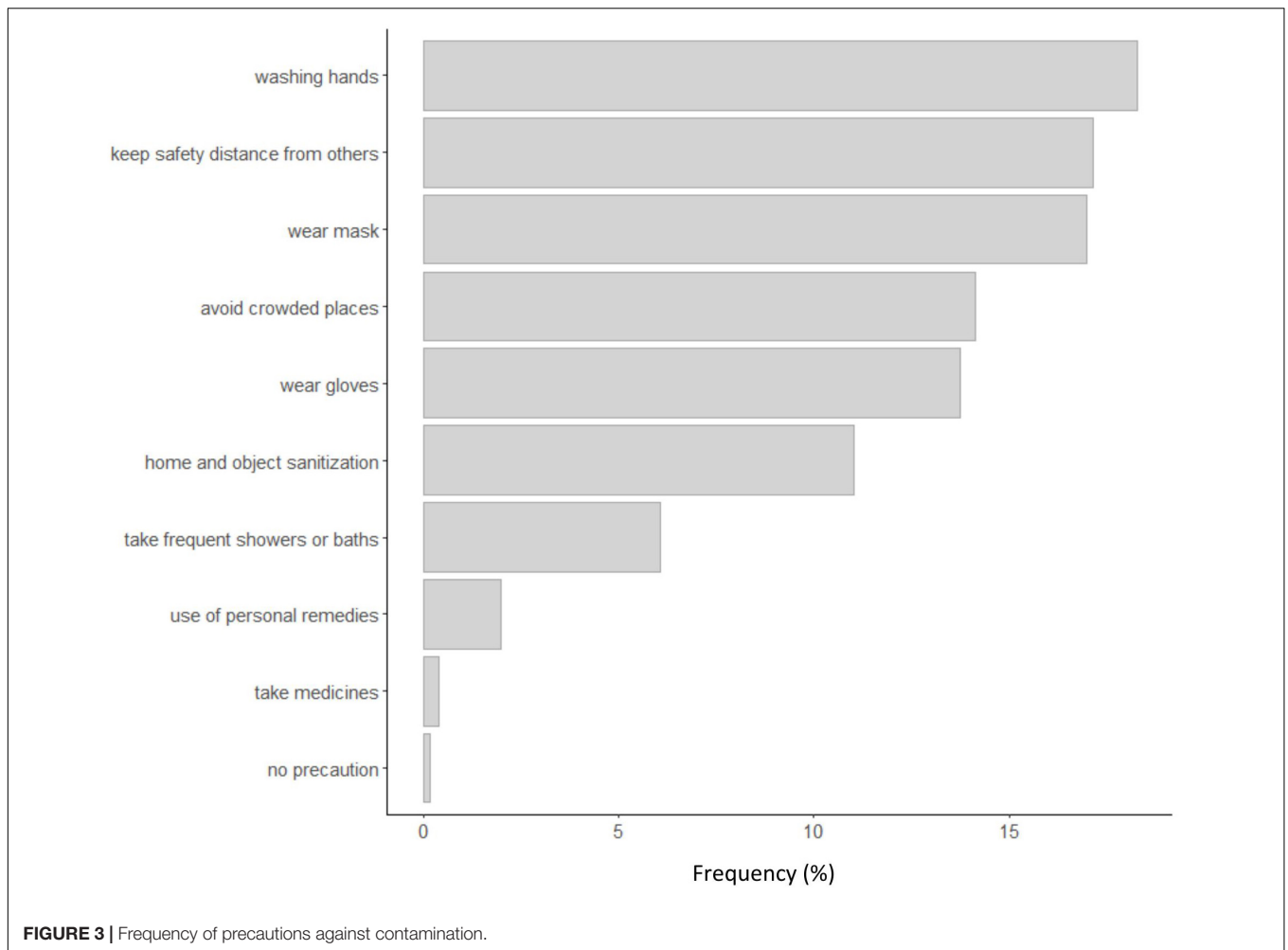
participants declared to have suffered from physical symptoms in the last 2 weeks. The majority of symptoms lasted less than 10 days. Moreover, 20.1% of participants declared that they had some relatives or friends infected by COVID-19. **Figure 1** shows the frequency of the different symptoms declared by participants. The most prevalent physical symptoms were insomnia or sleep disorder, followed by migraine, persistent exhaustion, and general malaise.

### Assessment of Participants' Knowledge and Fear About COVID-19

**Table 3** shows the mean ratings and standard deviation of participants' scores when they were asked to respond to some items to assess their knowledge and fear about COVID-19 and the risk to be contaminated.

Participants know that COVID-19 creates respiratory disease, that it can contaminate everyone, and that, initially, it was transmitted by animals to humans. Participants do not generally believe that COVID-19 is an artificial virus created in the laboratory, that it is only a banal flu, and that it affects specifically old people. Participants show a high level of fear about COVID-19. The greatest fears are the possibility that beloved persons can





be contaminated by the virus, the possibility to be contaminated, the genetic mutation of the virus, the difficulty to find valid therapies or vaccines, and the risk of social conflicts or wars. In relation to the means of contamination, participants say that the principal means are through air (cough or sneeze) and through contact with organic fluids (e.g., blood) or with contaminated objects.

### Assessment of Participants' Problems and Behavior During the Lockdown

**Table 4** shows what are the principal problems that caused disease in participants. The principal causes are the impossibility to see relatives or friends, the duration of the lockdown, and the obligation to stay at home.

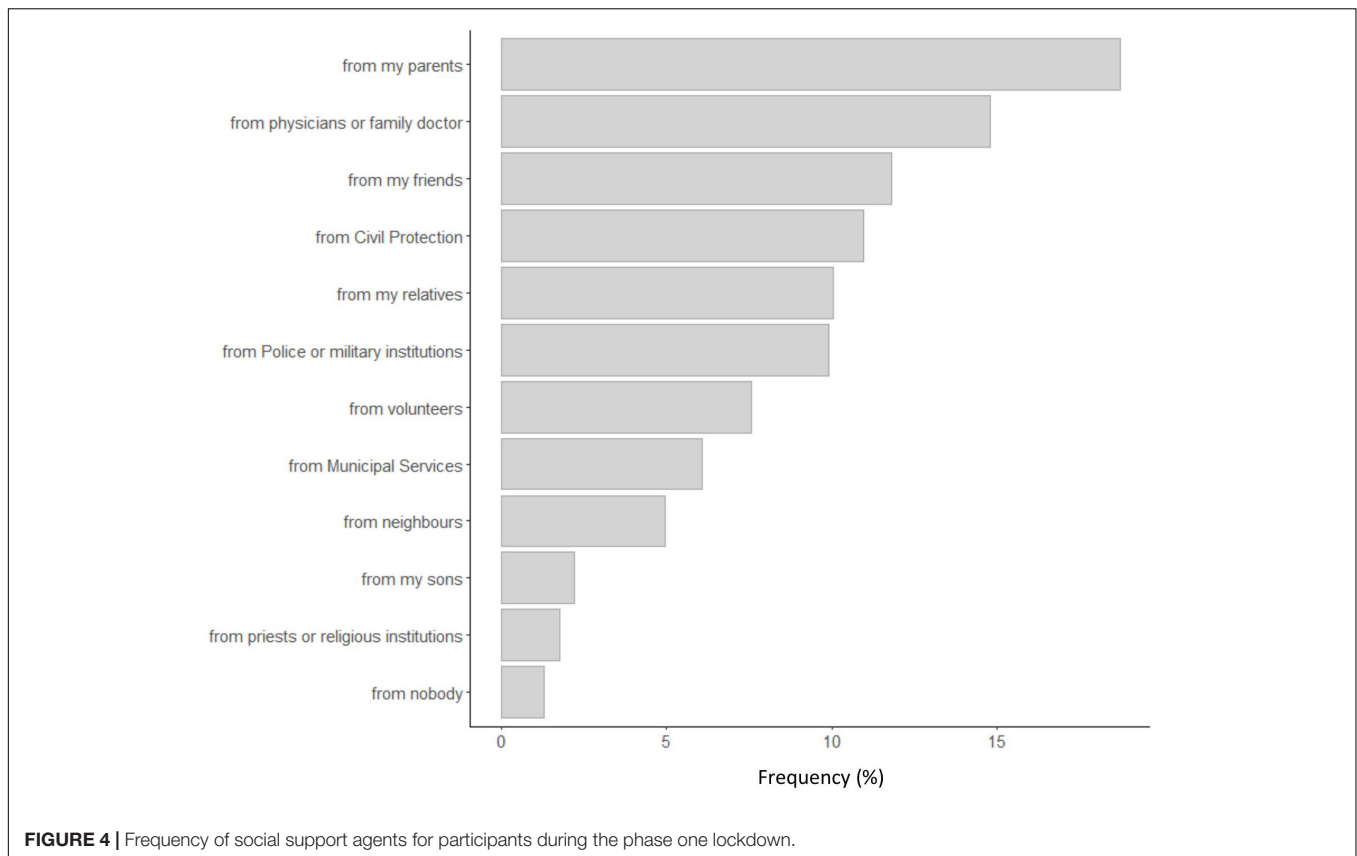
Of the participants, 59.81% reported a medium or high level of general disease, and 50% declared that the quarantine strongly changed their life and habits. Furthermore, 27% of participants stayed always at home, whereas 72% got out home only for necessity. Less than 1% declared to get out as they did before the lockdown. **Figure 2** shows the activities practiced at home during the lockdown (when not working) by participants.

Many of them watched TV or used the internet and did homework or hobbies. Very few people were completely inactive (less than 1%). **Figure 3** shows what were the most frequent precautions taken by participants to avoid contamination.

The most frequent precautions were the use of masks and gloves, washing hands frequently, sanitization of objects and rooms, observance of a safety distance from others, and avoidance of crowded places. Therefore, participants followed the principal instructions of the Italian Ministry of Public Health to reduce contamination risks. Less than 0.2% of participants declared that they did not take any precaution against contamination. **Figure 4** shows the principal agents of social support received by participants during the lockdown. Participants received social support principally from family (parents, sons, relatives), family doctors, friends, civil protection, police, and volunteers.

### Assessment of Psychological Conditions

**Table 5** shows the descriptive, reliabilities and correlations of the psychological scales used to assess psychological well-being, psychological resilience, and personality. Values of skewness and kurtosis are included in the range of  $-2$  and  $2$ ,



confirming that score distributions are prevalently normal (Gravetter and Wallnau, 2014).

Cronbach's  $\alpha$  values indicate acceptable or good reliability for each psychological scale (Kline, 2000). There are significant correlations between the MC scale for social desirability and the psychological measures, but correlations have small effect sizes because they are lower than 0.5 (Cohen, 1992). Anxiety, assessed by STAI, and depression, assessed by BDI, are strongly correlated with each other ( $r = 0.65$ ,  $p < 0.001$ ) and are all significantly and negatively correlated with the five traits of personality (extraversion, agreeableness, conscientiousness, emotional stability, and openness). Correlations vary from  $-0.68$  to  $-0.19$  for STAI and from  $-0.59$  to  $-0.25$  for BDI. We also reported the partial correlations after removing the variance due to age and gender. The  $p$ -values of correlations were adjusted according to the false discovery rate procedure (Benjamini and Hochberg, 2000). Anxiety and depression have the highest correlations with emotional stability and the lowest correlations with openness. Therefore, personality traits have some relations on psychological well-being. Anxiety and depression are negatively correlated with optimism, assessed with LOT-R, and with the three dimensions of the HHI scale. Therefore, people with a high level of optimism and hopefulness are less affected by anxiety and depression. The variation of life habits (life change) has some relations on anxiety ( $r = 0.19$ ,  $p < 0.001$ ), but not on depression, whereas the disease caused by the lockdown

is related to both o anxiety and depression ( $r = 0.42$  and  $0.36$ , respectively).

**Figure 5** shows the scatterplots of the correlations reported in **Table 5**, in relation to anxiety, assessed with the STAI, and depression, assessed with the BDI. Raw scores were transformed into standardized scores ( $z$  points) for allowing comparisons between scales. Scatterplots do not evidence particular anomalies in data distributions.

Of the participants, 15.04% of males obtained scores at the STAI equivalent to or higher than 55 (95th percentile for the male population), whereas 16.06% of females obtained scores at the STAI equivalent to or higher than 61 (95th percentile for the female population). Thus, the level of anxiety in the Italian sample during the phase one lockdown is practically tripled in relation to the cutoffs estimated in the normal population in the pre-pandemic period (Sanavio, 1997). The values of STAI corresponding to the mean of the Italian population are 37 for males and 40 for females (Sanavio, 1997). During the lockdown, the mean values of STAI increased to 41.45 and 47.38 for males and females, respectively. Therefore, the presence of a higher level of anxiety during the lockdown is confirmed by empirical data. **Figure 6** shows the frequencies of the level of depression (none, mild, moderate, and severe) in participants. More than 50% of participants show moderate or severe symptoms of depression. In particular, 41.31% of females and 30.97% of males show severe symptoms of depression, respectively. Therefore, the presence of a high level of depression during the lockdown is also confirmed.

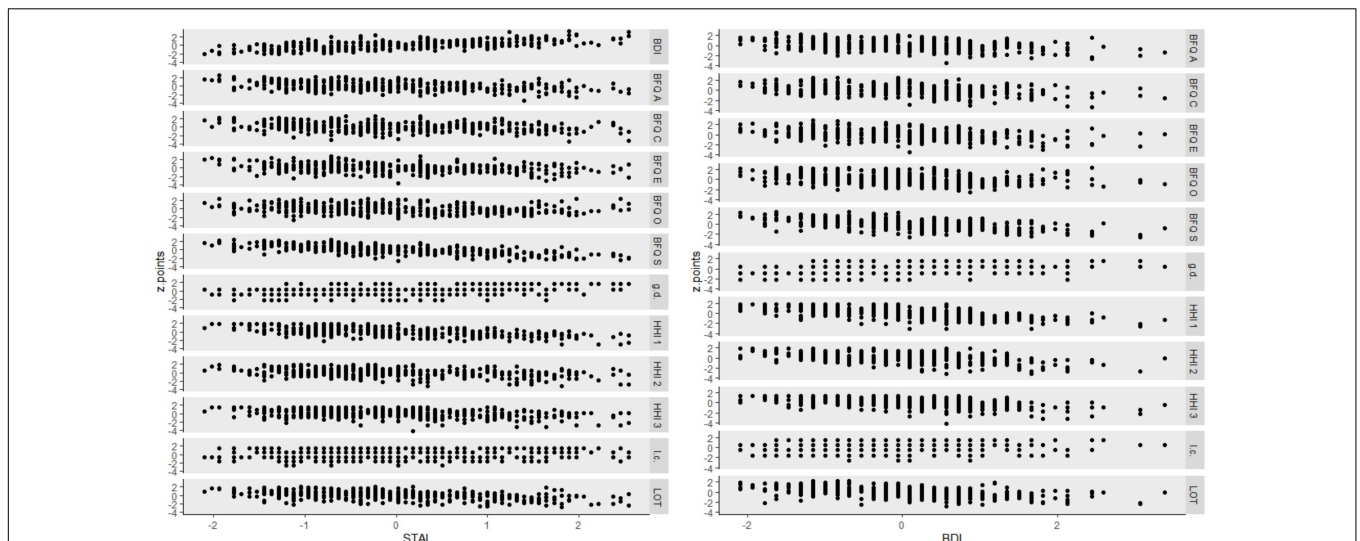
**TABLE 5 |** Descriptive statistics (mean, standard deviation, skewness, and kurtosis), reliability (Cronbach's  $\alpha$ ), and bivariate correlation between psychological variables and assessment of life change and disease generated by lockdown.

		Life change	General disease	BFO-E	BFO-A	BFO-C	BFO-S	BFO-O
MC	Mean	3.58	2.71	35.27	40.57	38.58	33.12	41.70
	Std. Dev.	1.01	0.80	7.22	5.90	6.56	8.34	6.20
	Skewness	-0.09	-0.04	-0.02	0.06	0.00	-0.13	0.38
	Kurtosis	0.12	0.12	0.37	-0.29	0.29	-0.23	-0.42
	Cronbach's $\alpha$	-	-	0.63	0.58	0.57	0.74	0.68
MC	Pearson's $r$	-0.06	-0.07	0.17	0.47	0.32	0.33	0.19
	$p$ -value	0.23	0.15	<0.001	<0.001	<0.001	<0.001	<0.001
STAI	Pearson's $r$	0.19	0.42	-0.27	-0.39	-0.26	-0.68	-0.19
	$p$ -value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Partial $r^*$	0.16	0.41	-0.25	-0.38	-0.24	-0.66	-0.17
BDI	Pearson's $r$	0.09	0.36	-0.38	-0.39	-0.39	-0.59	-0.25
	$p$ -value	0.06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Partial $r^*$	0.07	0.34	-0.35	-0.36	-0.36	-0.56	-0.24

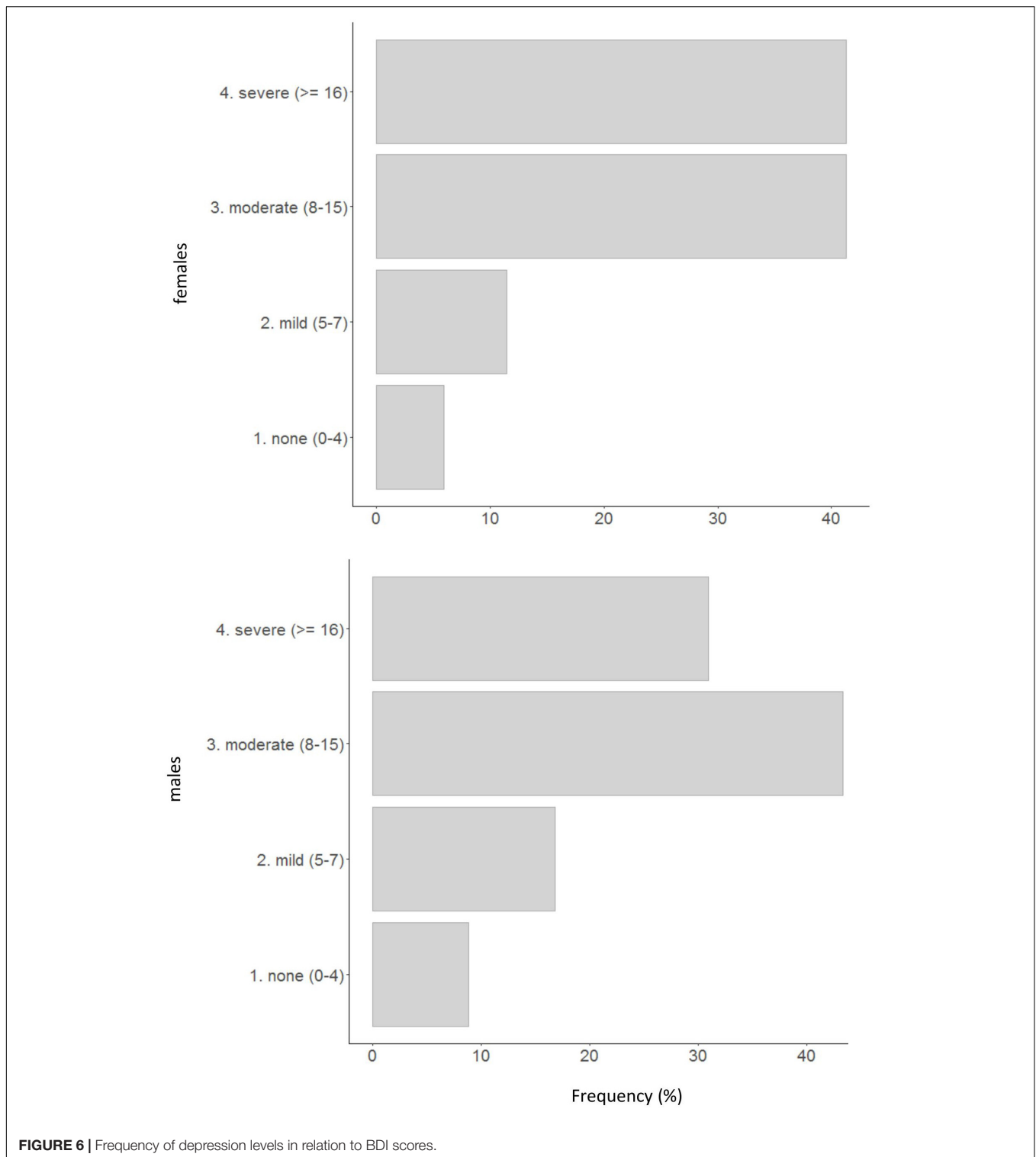
  

		LOT-R	STAI	BDI	HHI temp	HHI conn	HHI exp	MC
MC	Mean	19.53	45.78	13.39	11.89	11.93	12.90	30.40
	Std. Dev.	4.87	12.29	6.39	2.29	2.20	2.17	4.89
	Skewness	-0.22	0.33	0.32	-0.19	-0.48	-0.78	0.04
	Kurtosis	-0.22	-0.60	-0.05	-0.22	0.20	1.14	-0.19
	Cronbach's $\alpha$	0.82	0.94	0.78	0.68	0.57	0.71	0.64
MC	Pearson's $r$	0.30	-0.26	-0.34	0.29	0.36	0.23	
	$p$ -value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
STAI	Pearson's $r$	-0.46	-	0.65	-0.59	-0.40	-0.39	
	$p$ -value	<0.001	-	<0.001	<0.001	<0.001	<0.001	
	Partial $r^*$	-0.45	-	0.63	-0.58	-0.39	-0.39	
BDI	Pearson's $r$	-0.50	-	-	-0.64	-0.53	-0.54	
	$p$ -value	<0.001	-	-	<0.001	<0.001	<0.001	
	Partial $r^*$	-0.47	-	-	-0.61	-0.51	-0.54	

*\* , partial correlations (partial r) are estimated after removing effects of age and gender; life change, change of life habits due to quarantine; general disease, general level of disease caused by lockdown; BFO, Big Five Observer (E, extraversion; A, Agreeableness; C, Conscientiousness; S, Emotional Stability; O, Openness); LOT-R, Life Orientation Test Revised; BDI, Beck Depression Inventory; STAI, State-Trait Anxiety Inventory; HHI, Hope Herth Index (temp, temporality; conn, connectedness; exp, expentancy); MC, Marlowe-Crowne.*



**FIGURE 5 |** Scatterplots of the psychological measures (i.e., life change; g.d., general disease; BFO E, extraversion; BFO A, agreeableness; BFO C, conscientiousness; BFO S, emotional stability; BFO O, openness; HHI1, temporality subscale of hopefulness; HHI 2, interconnectedness subscale of hopefulness; HHI 3, positive expectancy subscale of hopefulness) in relation to anxiety (STAI) and depression (BDI). Raw scores were transformed into standardized scores (z points) for allowing comparison between scales.



## DISCUSSION

During the lockdown period, people are obliged to stay at home, even if they have permission to go out (to buy food, medicines, or for strong necessities). The data collected from our sample show

that people, during their mandatory permanence at home, are not totally inactive, and that they follow the provisions established by the Ministry of Public Health to avoid contamination (use of masks and glove, washing hands, safety distance observance from others, permanence at home). Only very few people declared



to have been contaminated by COVID-19, and many of them still claimed to be in a good health conditions, even when they were people suffering from other chronic diseases. About 20% of individuals reported having at least one relative or friend infected by COVID-19, and this could have affected their psychological status. The physical symptoms reported by participants were, above all, symptoms connected with a stressful condition of life. Migraine, sleep disorders, difficulty of concentration, and persistent exhaustion are typical signs of stress (American Psychological Association, 2010). Participants were clearly aware that COVID-19 was not a banal flu, that it could contaminate everyone, and that contamination could happen through air dispersion of the virus or through contact with contaminated objects. They were worried about a possible contamination toward themselves or toward their relatives or friends, about a possible virus mutation, or about the difficulty to find a valid therapy against the virus.

The principal result of our study is that the level of anxiety and the level of depression are very high in Italians during the lockdown period. The percentage of extreme anxiety is tripled, in relation to the pre-pandemic measured levels (Sanavio, 1997), and about 50% of participants show a moderate or severe level of depression. About 30% of males and 41% of females suffer from severe depression. Therefore, there are evidences that the lockdown have had negative effects on psychological well-being. However, some participants showed low levels of anxiety and depression, in particular, those who had high level of optimism and hopefulness. These people have a positive vision of the future and a strong confidence that their actions and behaviors can improve the negative situation and these characteristics, reasonably, can attenuate their psychological sufferance. Also, personality traits have some relations with anxiety and depression. People with high level of extraversion, agreeableness, conscientiousness, emotional stability, and openness have lower tendency to suffer from anxiety and depression.

Generally, the negative effects of the lockdown on psychological conditions are evident, confirming the importance of mental health prevention (Marazziti et al., 2020) and the necessity of psychological interventions against the negative impact of the pandemic on individuals (Holmes et al., 2020). Participants need psychological support, even if they do not suffer from mental or physical diseases (Brooks et al., 2020; Marazziti et al., 2020). Because of the impossibility to freely move outside the home during the lockdown, it could be useful to develop digital technologies for providing psychological support *via* internet, social networks, or apps for smartphones (McCord et al., 2015; Silva et al., 2015; Orrù et al., 2020). Through internet, it could be possible not only to provide direct assistance to people at home with the help of clinical psychologists and psychiatrists but also to teach and explain techniques for reducing psychological diseases and improving well-being, as, for example, mindfulness (Bullis et al., 2014; Saggino et al., 2017; Sood, 2020).

Both governments and private institutions should invest on mental health care of citizens, when big catastrophes happen. When negative events with a radical impact on population

activities happen, remedies for the population should be taken to overcome the consequential diseases (Holmes et al., 2020; Saglietto et al., 2020). Psychological diseases should not be neglected, because they have negative consequences on individuals, institutions, societies, and governments (Gyani et al., 2013; Layard, 2013; Brooks et al., 2020).

In 4 May, the Italian government declared the passage to the phase two of the pandemic for 18 May. Limits and restrictions of movement for the population were reduced, and some economic activities could restart. To test the evolution of anxiety and depression in this new phase, we asked participants if they wanted to repeat the survey. About 60% accepted positively to repeat the test.

One possible limit of this research is that the online survey cannot guarantee a perfect randomized selection of participants, but this was the only possibility because of the limits imposed by the lockdown. However, the different channels used to propagate the survey and the high number of participants allowed a collection of data from a sample composed of heterogeneous individuals of different parts of Italy. Another possible limit is the use of psychological tests, especially for the estimation of depression, that are not the typical test used by professional psychiatrists or clinical psychologists. However, we have to say that the BDI was used in more than 2000 studies (Richter et al., 1998), and that it is widely used by Italian clinical psychologists (Sica and Ghisi, 2007).

## DATA AVAILABILITY STATEMENT

The data analyzed in this study are subject to the following licenses/restrictions: Datasets are conserved by the authors in a safe place in respect of the Italian laws for the privacy. Requests to access these datasets should be directed to MT, marco.tommasi@unich.it.

## ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MT contributed to providing materials, data analysis, programming online survey, and searching of literature sources. FT contributed to collecting participants, providing materials, helping in manuscript revision, and searching of literature sources. SA contributed to collecting participants, programming online survey, and helping in manuscript revision. AC, MC, MD, and MS contributed to collecting participants, helping in manuscript revision, and searching of literature sources. LP and AS contributed to data analysis, helping in manuscript revision, and searching of literature sources. All authors contributed to the article and approved the submitted version.

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# The Effect of Concerns About COVID-19 on Anxiety, Stress, Parental Burnout, and Emotion Regulation: The Role of Susceptibility to Digital Emotion Contagion

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**Background and aims:** The COVID-19 pandemic has caused social and economic turmoil, which has led to enormous strain for many families. Past work with pandemic outbreaks suggests that media attention can increase anxiety and compensatory behaviors. Social isolation can lead to increase in online communication and parents who use social media may be affected by other people's emotions online through what is known as digital emotion contagion (DEC). The current study aimed to examine the role of DEC in the relationship between stress, concern about COVID-19, parental burnout and emotion regulation (ER).

**Methods:** In April 2020, an online survey was advertised in Social Media Parenting Groups and published on FIU Psychology online research system SONA. Data were analyzed using correlational analysis, linear and multiple linear regression, and moderation analysis.

**Results:** Concern about COVID-19 predicted stress, depression, and parental burnout. Susceptibility to DEC significantly increased the impact of stress on parental burnout. Having relatives infected with COVID-19 increased the effect of DEC on parental burnout. A higher level of ER buffered the relationship between emotion contagion and concern about COVID-19.

**Conclusion:** These findings suggest that susceptibility to digital emotion contagion may have a negative effect on parents. Digital emotion contagion may increase parental burnout and is tied to stress.

**Keywords:** COVID-19, parental burnout, concern about COVID-19, digital emotion contagion, emotion regulation

## INTRODUCTION

The COVID-19 pandemic has caused social and economic turmoil, which has led to enormous strain for many families (1, 2). Parents who are currently living with children may have been particularly impacted by COVID-19 due to social and physical isolation, the risk of unemployment, the financial strain, and the challenges of balancing work and family life while schools are on

lockdown. Increasing numbers of US mothers have symptoms of clinical depression and anxiety during the pandemic (3, 4). Anxiety may lead to burnout (5), which can have detrimental consequences for parents' and children's well-being (6). It is important to study the ways that American families have been affected by the COVID-19 outbreak to determine how concerns about or fears of the virus may have led to excessive anxiety, stress, and parental burnout and to understand whether parental emotion regulation (ER) strategies may have buffered these effects.

In addition, being on lockdown during quarantine, many parents and children have used telecommunication to stay connected with their family, friends, teachers, and colleagues. The majority of contact occurs via the internet, which was actively used by mothers before the Pandemic: during the year 2018, 59% of U.S. mothers accessed social media several times per day, and spent 214 min browsing the internet on a daily basis (7). Thus, it is worth considering the ways in which digital connections may have affected mental health. As it spreads, COVID-19 has been frequently reported in mass media and social media (e.g., Facebook and Twitter). Importantly, past work with pandemic outbreaks suggests that media attention can increase anxiety and compensatory behaviors (8). Online communication takes a multitude of forms, including navigating social media either actively (e.g., posting on Facebook parenting groups and asking for advice) or passively (e.g., reading what other users post and not engaging in communication). Emotional experiences are often "contagious" in that they can be transmitted from one person to another, which is so-called emotion contagion effects. Parents who use social media may be susceptible to digital emotion contagion (DEC), which involves being affected by other people's emotional expressions online. In social isolation, parents may become prone to either positive or negative DEC, which can affect their anxiety, stress, and burnout. However, very little is known about the ways that DEC affected parents during the COVID-19 pandemic.

In light of its easy transmission and severity of its symptoms, many individuals have experienced anxiety about contracting COVID-19. This can be interpreted as a specific manifestation of illness anxiety, which refers to a set of emotional experiences that are tied to imaginary threats of becoming ill. It is normal and adaptive to have some level of anxiety and concern about one's health (9) because this can motivate protective actions like handwashing and following social distance guidelines. However, individuals who are fearful of a pandemic illness can become excessive and maladaptive, leading to significant distress and impairment in functioning (10). According to Schimmenti (11), the COVID-19 pandemic is characterized by the following fear experiences: (a) fear of the body/fear for the body, (b) fear of significant others/fear for significant others, (c) fear of not knowing/fear of knowing, and (d) fear of taking action/fear of inaction. This set of fears manifests in anxieties that people may have about the virus. One of the core features of these fears and anxieties is personal relevance of the pandemic that increases fear reactions along with the presence of the chronic illness and death in the family due to COVID-19 (4). In the present study, we asked participants if any of their relatives had been infected with

COVID-19, aiming to examine the relationship between one of the anxieties mentioned above (i.e., fear for significant others), excessive concern about COVID-19, and parental burnout.

Risk factors for excessive illness anxiety about COVID-19 include heightened trait health anxiety and cyberchondria, while receiving realistic information about the pandemic and using adaptive ER strategies appear to help individuals to cope with anxiety (4). According to Jungmann and Witthöft (4), excessive use of the internet during the pandemic may be considered a safety-seeking behavior that people use to cope with illness anxiety toward COVID-19. However, this intensive internet browsing may paradoxically affect people's emotions as they may read threatening information that increases anxiety.

COVID-19 is highly publicized in the mass and social media. Past research on other pandemic illness outbreaks showed that media reports about the spread of virulent illnesses such as H1N1 "Swine Flu," Ebola, and Zika led to excessive anxiety and stress (8). Therefore, the extent to which COVID-19 has been covered in the media and online is likely to lead to high levels of anxiety. However, the association between using social media and anxiety is complex and multifaceted. There is evidence of increased life satisfaction as a result of social media usage (12). Simultaneously, Dhir et al. (13) showed that compulsive social media usage evoked social media fatigue, which resulted in elevated anxiety, fear of missing out valuable information, and depression. Research indicated that mothers use social networking sites to seek information about the expectations of motherhood, improve confidence as a mother (14), compare themselves to other mothers, and express emotions (15). Online communication may involve social support and foster a sense of connection and increase well-being when people use Facebook actively (16). Meanwhile, passive usage of social media decreases emotional well-being and increases envy, which, along with social comparison, moderates the relationship between Facebook use and depression (17). Amaro (18) found that greater downward comparison led to greater parenting satisfaction. Thus, if a mother compares herself to other mothers and concludes that she is more successful, she feels satisfied as a parent.

Currently, there is a limited amount of data on the relationship between social media usage by parents, anxiety, and burnout during a Pandemic. These relationships may be moderated by susceptibility to digital emotion contagion (DEC), which is the tendency to mimic and synchronize nonverbal behaviors with those of another person (19). According to Hess and Fisher (20), emotional mimicry evolves in a specific social context when people seek affiliation, thus, most often people aren't mimicking emotions of strangers or antagonistic emotions. However, this relates mostly to positive emotions (e.g., excitement and happiness), while negative emotions (e.g., anger and sadness) are more likely to be contagious among strangers, which forms an emotional ripple effect (21, 22) and amplifies shared stressful experiences (23). Moreover, when people observe others dealing with a stressful situation, their cortisol levels elevate, eliciting affective stress contagion (24). Thus, if a person is surrounded by strangers, they will be more likely to "catch" negative emotions than positive ones. This is especially relevant for the online communication where



people are susceptible to DEC (25). DEC is further mediated by social media and other online communication platforms. It can increase both positive (e.g., joy, love, compassion) and negative (e.g., fear, anxiety, sadness) emotions (26). Additionally, social media (e.g., Facebook) may lead to envy and decline in positive mood over time (27). Given that the relationship between DEC and social media is still an evolving topic in the field and that COVID-19 is an emerging situation, little is known about how DEC affects parents who use social media platforms during COVID-19 pandemic. Furthermore, very few studies have examined personal characteristics related to emotion contagion. Goldenberg and Gross (25) argue that the degree of contagion may be affected by social media behaviors, age, gender, culture, and time spent online along with the activity vs. passivity. One of the personal characteristics that leads to emotion contagion may be proneness to engage emotionally with other people online. Doherty (28) developed a measure for emotion contagion to assess individual differences in “susceptibility to emotion contagion (i.e., the likelihood of “catching” the emotions of others)” (p. 132). Scores on this measure indicated that emotion contagion was positively associated with sensitivity to others, self-esteem, and empathy. Susceptibility to catch other people’s emotions was negatively associated with self-assertiveness, emotional stability, and alienation (p. 149). Ferrara and Yang (29) identified two types of individuals based on the level of susceptibility to emotion contagions: highly and scarcely susceptible users. Although people of both types are equally prone to take on positive emotions, there are different in the inclination to adopt negative emotions, with scarcely susceptible users having higher negative emotions.

Research on the relationship between burnout and emotion contagion is scarce. Petita and Jiang (30) found a positive relationship between burnout and contagion of fear and a negative relationship between joy contagion and burnout. The authors explored the relationship between job uncertainty and emotion contagion and argued that the contagion of fear increases the feeling of uncertainty, which leads to exhaustion. Uncertainty accompanies parents who are trying to balance work and family during the pandemic, leading to parental burnout.

Parental burnout is a combination of a shattering exhaustion and a feeling that you are not good enough as a parent (6), which often stems from social comparison (31). Precursors to parents becoming burned out may include experiencing high levels of parenting stress, social pressure to be an ideal parent, trying to avoid parenting mistakes, assuming primary responsibilities for caring for the children in comparison to the partner’s parenting responsibilities. Mikolajczak and Roskam (6) established a theoretical framework for understanding parental burnout through the perspective of keeping a balance between risks and resources. Risks are defined as factors that increase parental stress, such as low emotional intelligence, lack of support, and excessive parental duties. Resources, on the other hand, decrease stress and enhance well-being. Parental stress may be alleviated by regular self-compassion practices, self-care, social support, and positive co-parenting. During the COVID-19 pandemic outbreak, parental stress levels have increased as

the perceived risks increase. Many parents are fearful about becoming ill, not only for themselves but also for their loved ones. Additionally, the burden on many parents has increased as they juggle both working and homeschooling their children. Others have suffered lost jobs or have had to keep going to work in places where they could become infected with the COVID-19. These risks strain typical resources that parents use to maintain the risks/resources equilibrium. Thus, to cope and maintain well-being, a parent needs to add more resources, which is often challenging in the midst of the crisis, leading to the development of the burnout.

According to Roskam et al. (32), parental burnout consists of four components: (a) contrast, (b) saturation, (c) distancing, and (d) exhaustion. Contrast represents the change between what a person used to be as a parent and being ashamed for what they have become as caregivers. Saturation is metaphorically described as being “fed up” with parenting. Distancing is an inability to do anything outside of usual routines. Finally, exhaustion represents overtiredness associated with the parenting role. These four components are of particular interest to the current study. The contrast scale resembles the burnout coming from comparing oneself in the current situation with a parent you were before. Parents may compare themselves with how they used to parent before the COVID-19 pandemic and may feel ashamed for not being good enough parents. Distancing could show itself through inability to change the routine easily, which would be understandable given increased parenting demands. Exhaustion would show that parents do not have enough resources to handle their responsibilities during the pandemic. Saturation would explain how being a parent is not something mothers and fathers enjoy during quarantine.

Burnout is tied to stress, which increases in emergency situations such as COVID-19 pandemic. Various factors can moderate the relationship between stress and burnout, such as social support (33), optimism, pessimism, and coping (34). Etzion (33) found that social support mitigates the effect of stress on burnout. Riolli and Savicki (34) discovered that the lower optimism and higher pessimism were related to depersonalization and emotional exhaustion under high chronic stress, and higher escape coping led to depersonalization. Although these studies were not conducted on parents, they provide insight on the potential relationship between stress and burnout that researchers may find among parents during the COVID-19 pandemic. For instance, Koeske and Koeske (35) found that parental stress was associated with lower role satisfaction and self-esteem among mothers who did not get enough social support, which aligns with the research done by Etzion. Seeking social support may be one of the ER strategies that mothers may use when they try to change their negative emotions such as illness anxiety or depression. Social support can help mothers to get ideas on how to reinterpret the meaning of the situation with ER strategy of cognitive reappraisal. However, little is known about the role of ER in the relationship between stress and parental burnout. This represents an important gap in the literature, given that ER is a powerful resource that could aid in mitigating the stress brought up by COVID-19.

Experiences of stress, burnout and negative emotions during the COVID-19 pandemic take a toll on parents who may try to regulate how they feel using a variety of strategies and techniques to modify emotional experiences and expressions. Emotion regulation (ER) represents time-limited, goal-directed, situationally relevant efforts to change positive and/or negative emotional states. People use ER to uplift and/or down-regulate both positive and negative emotions [(36), p. 1]. ER benefits the self, partners, and family members, alleviating the burden of stress (37). Two most frequently researched ER strategies are cognitive reappraisal and expressive suppression (38). Cognitive reappraisal represents an attempt to change the meaning of the situation that evoked an emotion to change its emotional relevance (38). Expressive suppression defines efforts to hide emotional expression and pretend that the emotion is not taking place. Although, there is evidence showing positive effects of suppression [e.g., (39)], this strategy is found to be less effective than reappraisal because it decreases behavioral expression of an emotion and is less likely to change an emotion experience while increasing physiological reactions for people who suppress emotions (40). Cognitive reappraisal is effective in changing both internal emotional experience and external behavioral manifestation of this experience (41). One of the explanations why cognitive reappraisal may be more effective is that it is usually used when the emotion starts to unfold and is not as strong as it becomes when suppression is used, thus, requiring fewer resources to change the emotion (42). An example of cognitive reappraisal used by a parent during the COVID-19 pandemic could be trying to think about a situation with homeschooling as an opportunity to spend more time with children. An example of emotion suppression would be feeling frustrated with a child who is not doing their homework and trying to hide frustration, pretending that it doesn't affect the parent. Both reappraisal and suppression were found to be related to specific coping strategies. People who often use reappraisal are more satisfied with life, more optimistic, and have greater self-esteem (38). However, it is possible that parents under conditions of high stress may have limited abilities to use cognitive reappraisal (43). In the current study, ER was measured to assess its potential moderating role between concern about COVID-19 and parental burnout.

## RESEARCH HYPOTHESES

The current study provides insight about the mechanisms that moderate the effect of stress on parental burnout, including the potential mitigating function of ER on the development of parental burnout among parents during a Pandemic.

Our hypotheses were:

*H1: Degree of concern about COVID-19 predicts parental burnout.*

*H2: Digital emotion contagion moderates the relationship between concern about COVID-19 and parental burnout.*

*H3: ER moderates the relationship between digital emotion contagion and concern about COVID-19.*

**TABLE 1 |** Demographic background of participants.

Variables	Categories	Frequency	Percent
Gender	Mother	142	91.6
	Father	10	6.5
# of Children	1	62	40.0
	2	64	41.3
	3	19	12.3
	4	1	0.6
Education	less than high school	3	1.9
	High school or equivalent	1	0.6
	Some college	3	1.9
	Associate degree	47	30.3
	Bachelor's degree	14	9.0
	Master's degree	21	13.5
	Professional/Specialty degree	2	1.3
	Doctoral degree	61	39.4
Race	Others	1	0.6
	Black/African American	20	12.9
	White/Caucasian	114	73.5
	Asian	4	2.6
Ethnicity	Others	16	10.3
	Hispanic/Latino	50	32.3
	Non-Hispanic/Latino	100	64.5

## MATERIALS AND METHODS

### Procedure

Following institutional review board (IRB) approval, the first author recruited participants on social media (Facebook, Twitter, and Instagram) via poster flyer campaigns, online research system at the Florida International University (SONA), and word of mouth. The researchers also used a snowball sampling approach by asking participants to forward the information about the study to other parents. The researchers used Qualtrics, an online survey portal, to distribute the survey and collect data in April 2020.

### Participants

The targeted population was adults who had children living with them. There were 155 parents who participated in the study, 142 mothers (92%) and 10 fathers (7%). The average age of participants was 37.25 years old ( $SD = 8.20$ ), with an age range of 21–59. Forty percent of participants had one child, 41.3% had two children, and 12.3% had three children, and 0.6% had four children. The average age of a child was 12.6 years old. The majority of the parents were married (78.1%). Over a third of the participants had a doctoral degree (39.4%), 30.3% had associate and 13.5% had a master's degree. The participants were mostly White (73.5%), 12.9% of them identified themselves as Black, and 32.3% were Hispanic/Latino (see **Table 1**).

### Measures

#### Concern About COVID-19

Concern about COVID-19 was measured by COVID-19 Threat Scale [CTS; (44)]. The CTS is a self-report inventory that

was developed by adapting a questionnaire assessing anxiety in response to the H1N1 “Swine Flu” Influenza (8). Items on the CTS quantify threat-related perceptions of the Coronavirus utilizing a 5-point Likert Scale (from 1- “Not at all” to 5- “Very Much”). Items asked participants to rate their fears that COVID-19 will spread widely in the United States, their fears about becoming ill or family members becoming ill, as well as behavioral changes in response to COVID-19 (e.g., decisions to be around other people, handwashing). Higher scores reflect a greater level of anxiety and more threat-related behaviors due to COVID-19. The Cronbach’s Alpha of the scale was 0.84 in the current study.

## Digital Emotion Contagion

Susceptibility for digital emotion contagion was measured via a modified emotion contagion scale developed by Doherty (28). The scale has 15 items and five subscales: happiness, love, fear, anger, and sadness. The items were modified to reflect online communication. An example of an item for the love subscale was, “When I look at the social media pictures of the one I love, my mind is filled with thoughts of romance.” An example of an item for the happiness subscale was, “Being with a happy person on social media picks me up when I’m feeling down.” The sadness scale had items such as, “I cry at sad videos on social media.” An example of an item for the fear subscale was, “Watching the fearful faces of victims on the news makes me try to imagine how they might be feeling. The Anger subscale was represented by items such as, “I clench my jaws and my shoulders get tight when I see the angry faces on the news on social media.” Participants rated their responses on a five-item Likert-type scale (from 5— “Always” to 1— “Never”). Cronbach’s Alpha for the susceptibility for the digital contagion scale was 0.86 in the current study.

## Parental Burnout Assessment

Parental burnout was measured using the 23-item Parental Burnout Assessment (PBA; 24). The PBA is used to assess the levels of exhaustion, saturation, contrast, and distancing of parental burnout. Sample items include “I find it exhausting just thinking of everything I have to do for my child(ren),” (exhaustion subscale), “I feel like I can’t take any more as a parent” (saturation subscale), “I’m ashamed of the parent that I’ve become” (contrast subscale), and “I’m no longer able to show my child(ren) how much I love them” (distancing subscale). Participants rated items on a 7-point Likert scale with response options ranging from “Never” to “Every day.” High scores reflect a high level of parental burnout. Cronbach’s alpha of the total scale was 0.97 in the current study. Alphas of items measuring exhaustion, contrast, saturation, and distancing were 0.95, 0.92, 0.95, and 0.86, respectively.

## Depression, Anxiety and Stress Scale (DASS-21)

Distress was measured using Depression, Anxiety and Stress Scale (DASS-21; 35), which included three 7-item subscales (depression, anxiety and stress). Examples of items were, “I couldn’t seem to experience any positive feeling at all”

(depression subscale), “I found it difficult to relax” (stress subscale) and, “I was worried about situations in which I might panic and make a fool of myself” (anxiety subscale). Participants rated their responses on a 4-item scale, where 0 was “Did not apply to me at all,” 1— “Applied to me to some degree, or some of the time,” 2— “Applied to me to a considerable degree or a good part of time,” and 3—Applied to me very much or most of the time.” In the current study, Cronbach’s alpha of the total scale was 0.94. Alphas of items measuring stress, anxiety, and depression were 0.90, 0.82, and 0.87, respectively.

## Emotion Regulation

Emotion Regulation Questionnaire [ERQ; (38)] was used to assess participants’ tendency of using cognitive reappraisal and/or expression suppression to regulate their emotions. The items were rated on a 7-point Likert-type scale (1 = “Strongly disagree” to 7 = “Strongly agree”). An item example of the cognitive reappraisal subscale was, “When I want to feel more positive emotion (such as joy or amusement), I *change what I’m thinking about*.” An item example for the expressive suppression subscale was, “When I am feeling positive emotions, I am careful not to express them.” Cronbach’s Alpha of the ERQ was 0.82.

## DATA ANALYSIS

Before main data analyses were performed, we checked the effects of participants’ gender and age on the main variables we examined. Concern about COVID-19 was not significantly different across gender ( $t^1_{(9,31)} = 0.11, p = 0.91$ ). Though significant differences were found among different age groups [ $F_{(3,68.9=08)} = 4.72, p = 0.005$ ], *post-hoc* analysis showed that there was only a marginally significant difference between 21–30 and 41–50 age groups ( $t = 0.52, p = 0.05$ ). Digital emotional contagion among parents was not significantly different across gender ( $t_{(9,33)} = 0.80, p = 0.40$ ) and age groups [ $F_{(3,149=08)} = 0.85, p = 0.47$ ]. These were the same with total score of parental burnout (gender,  $t_{(9,61)} = 0.18, p = 0.86$ ; age groups,  $F_{(3,149)} = 2.27, p = 0.08$ ) and emotional regulation questionnaire scores (gender,  $t_{(9,28)} = 0.50, p = 0.63$ ; age groups,  $F_{(3,45.03)} = 1.39, p = 0.26$ ). DASS score was not significant across gender ( $t_{(9,54)} = 0.45, p = 0.66$ ). However, it was significantly different across age groups [ $F_{(3,49.76)} = 9.28, p < 0.001$ ] and parents of 31–40 years old had significantly higher score than those over 50 years old ( $p = 0.001$ ). Further analyses found that stress [ $F_{(3,149)} = 4.56, p = 0.004$ ] and depression scores were significantly different across age groups [ $F_{(3,149)} = 2.93, p = 0.04$ ], but anxiety was not significant [ $F_{(3,149)} = 1.84, p = 0.14$ ]. These indicated that gender was not a confounding variable in the main analyses but age was one when stress and depression were the dependent variables.

Correlational analysis was first used to examine the relationships between concern about COVID-19, stress,

<sup>1</sup>When statistical assumption of homogeneity of variance was not supported in the independent sample t-test, the degree of freedom was a decimal to correct for the non-homogeneity of variance. When the same assumption was not supported in ANOVA, Welch test was used and a degree of freedom with a decimal was reported for the same purpose.

**TABLE 2 |** Descriptive statistics and correlations for study variables.

Variable	M	SD	1	2	3	4	5	6	7	8
1. Depression	1.8	0.71	1	0.80**	0.59**	0.55**	0.59**	0.60**	0.27**	0.20*
2. Stress	2.3	0.8	0.80**	1	0.62**	0.49**	0.48**	0.43**	0.25**	0.225*
3. PBA Exhaustion	3.2	1.8	0.58**	0.62**	1	0.79**	0.76**	0.64**	0.24**	0.20*
4. PBA Contrast	2.2	1.5	0.55**	0.49**	0.79**	1	0.84**	0.79**	0.09	0.25**
5. PBA Saturation	2	1.5	0.59**	0.48**	0.76**	0.84**	1	0.84**	0.14	0.17*
6. PBA Distancing	1.8	1.3	0.60**	0.43**	0.64**	0.79**	0.85**	1	0.12	0.18*
7. Concern about COVID-19	4.2	0.63	0.27**	0.35**	0.24**	0.09	0.14	0.12	1	0.27**
8. Digital Emotion Contagion	3.3	0.66	0.20*	0.22**	0.20*	0.25**	0.17*	0.17*	0.27**	1

\* $p < 0.05$ . \*\* $p < 0.01$ ,  $N = 155$ .

DEC, general anxiety and depression, parental burnout, and ER. Linear and multiple linear regression analysis was conducted to assess the relationships between illness anxiety, parental burnout, DEC, and ER. Moderation analyses were performed to address hypotheses two and three. Moderation focuses on “when” questions and a moderation effect is usually present when a third variable affects the relationship between predictor and outcome variables (45). All the analyses were conducted in IBM SPSS (Version 26), and moderation analysis was conducted via PROCESS SPSS—a versatile modeling tool developed to integrate many features that exist separately in a few popular statistical software programs, such as, mean centering predictors to reduce multicollinearity (46), providing information about how much variance in the outcome variable can be explained by the model and specifically by the interaction (47). Additionally, participants were asked questions regarding their personal experiences during COVID-19 Pandemic, such as: “Do you personally know anyone who got infected with Coronavirus?” and “Do you personally have a relative who is currently infected with Coronavirus? They were also asked to report their demographic background information, such as age, gender, race, ethnicity.

## RESULTS

Correlations among study measures are presented in **Table 2**. Linear regression analysis then examined whether concern about COVID-19 predicted stress and depression. Because age was had a significant effect on stress and depression, it was added to the regression models (see **Table 3**). The results showed that both stress and depression were predicted by concern about COVID-19 [ $F_{(2,150)} = 10.80, p < 0.001$  for stress;  $F_{(2,150)} = 6.00, p = 0.003$  for depression]. However, age was not significant in both models ( $p = 0.50$  for stress;  $p = 0.94$  for depression). In turn, Concern about COVID-19 moderately predicted parental burnout,  $F_{(1,154)} = 5.465, p < 0.05$ , which supports H1. Comparatively speaking, concern about COVID-19 explained more variance in stress (12.6%,  $\beta = 0.36, t = 4.64, p < 0.001$ ) than in depression (7.4%,  $\beta = 0.27, t = 3.37, p = 0.001$ ) and parental burnout (3.4%,  $\beta = 0.19, t = 2.34, p = 0.02$ ) (see **Table 2**).

The moderation effect of digital emotion contagion (DEC) on the relationship between concern about COVID-19 and total score of the parental burnout measure was not significant, thus, H2 was not supported. However, analysis of the subscales of

**TABLE 3 |** Regression analyses of concern about COVID-19 and stress, depression, and parental burnout.

Predictor	B	SE	$\beta$	t	p
<b>Regression Analysis of Concern about COVID-19 and Stress</b>					
(Constant)	0.46	0.42		1.01	0.27
Concern	0.46	0.10	0.36	4.64	0.00
Age	-0.05	0.07	-0.05	-0.68	0.50
$R^2 = 0.121$					
<b>Regression Analysis of Concern about COVID-19 and Depression</b>					
(Constant)	0.48	0.38		1.26	0.21
Concern	0.31	0.09	0.27	3.37	0.001
Age	0.01	0.07	0.01	0.07	0.94
$R^2 = 0.074$					
<b>Regression Analysis of Concern about COVID-19 and Depression</b>					
(Constant)	0.68	0.78		0.87	0.39
Concern	0.43	0.19	0.19	2.34	0.02
$R^2 = 0.034$					

parental burnout yielded significant results. More specifically, the moderation effect of DEC on the relationship between stress and parental contrast sub-scale showed that both stress ( $p < 0.001$ ) and DEC ( $p = 0.02$ ) and the interaction between stress and DEC ( $p = 0.04$ ) significantly predicted contrast and all were positive predictors (see **Table 4**). This suggests that stress has a significant effect on parental contrast when emotion contagion is high, or in other words, emotion contagion significantly increases the impact of stress on parental contrast. The whole model explains 28% of the variance in parental contrast, with about 2% contributing from the interaction. Comparatively speaking, stress had a higher coefficient, while DEC and the interaction had very similar coefficients (see **Table 4**).

The same analyses were conducted with the other three subscales of parental burnout. Stress significantly predicted parental exhaustion ( $p < 0.001$ ) and saturation ( $p < 0.001$ ), but DEC did not ( $p = 0.35$  for exhaustion,  $p = 0.24$  for saturation) and the interaction terms were also not significant ( $p = 0.93$  for interaction in exhaustion model,  $p = 0.06$  for saturation model). In addition, stress significantly predicted parental distancing ( $p < 0.001$ ), while emotion contagion did not ( $p = 0.15$ ). However, the interaction of stress and DEC was a significant predictor



**TABLE 4 |** Moderation analyses of DEC between stress and parental burnout sub-scales.

Predictor	B	b 95% CI [LL, UL]	SE	t	p
<b>Moderation Effect of DEC between stress and parental contrast</b>					
(Constant)	2.15	1.95–2.35	0.10	21.05	<0.001
Stress	0.79	0.53–1.05	0.13	6.05	<0.001
Emotion contagion	0.37	0.06–0.68	0.16	2.33	0.02
Interaction	0.35	0.02–0.69	0.17	2.09	0.04
$R^2 = 0.28$					
<b>Moderation Effect of DEC between stress and parental exhaustion</b>					
(Constant)	3.17	2.94–3.40	0.12	27.24	<0.001
Stress	1.35	1.06–1.64	0.15	9.09	<0.001
Emotion contagion	0.17	–0.19–0.52	0.18	0.94	0.35
Interaction	–0.02	–0.40–0.36	0.19	–0.09	0.93
$R^2 = 0.38$					
<b>Moderation Effect of DEC between stress and parental saturation</b>					
(Constant)	1.95	1.74–2.17	0.11	17.82	<0.001
Stress	0.86	0.58–1.13	0.14	6.13	<0.001
Emotion contagion	0.20	–0.14–0.53	0.17	1.17	0.24
Interaction	0.34	–0.02–0.70	0.18	1.87	0.06
$R^2 = 0.26$					
<b>Moderation Effect of DEC between stress and parental distancing</b>					
(Constant)	1.74	1.54–1.93	0.10	17.72	<0.001
Stress	0.65	0.40–0.89	0.12	5.19	<0.001
Emotion contagion	0.22	–0.08–0.52	0.15	1.44	0.15
Interaction	0.41	0.09–0.73	0.16	2.52	0.01
$R^2 = 0.23$					

of parental distancing ( $p = 0.01$ ) (see **Table 4**). This indicates that, like with the parental contrast subscale, emotion contagion increases the impact of stress on parental distancing. The whole model explained 23% of the variance in parental contrast, with about 3% variance accounted for by the interaction.

The effect of stress on parental burnout was further moderated by knowing people who are infected with COVID-19 ( $p < 0.001$ ). Stress ( $p < 0.001$ ) and the interaction between stress and knowing people infected with COVID-19 ( $p < 0.01$ ) had significant positive effects on parental burnout, indicating that having relatives infected with COVID-19 increased the effect of stress on parental burnout. The whole model explained 37% of the variance in parental burnout. The effect of DEC on parental burnout was also moderated by having relatives infected with COVID-19. DEC ( $p < 0.01$ ) and the interaction ( $p < 0.001$ ) between DEC and having a relative infected with COVID-19 had significant positive effects on parental burnout, indicating that having relatives infected with COVID-19 increases the effect of DEC on parental burnout. The whole model explained 15% of the variance in parental burnout (see **Tables 5, 6**).

We also tested *H3* through moderation analysis. The results indicated that DEC significantly predicted concern about COVID-19 ( $p < 0.001$ ), whereas individual ER did not ( $p = 0.29$ ). The interaction between DEC and ER had a significant ( $p < 0.001$ ) yet negative effect on the relationship (see **Table 7**). This indicates that a higher level of ER significantly reduces

**TABLE 5 |** Moderation effect of having relatives infected with COVID-19 between parental burnout and DEC.

Predictor	B	b 95% CI [LL, UL]	SE	t	p
Constant	2.48	2.27–2.70	0.11	22.67	<0.001
Digital emotion contagion	0.43	0.10–0.76	0.17	2.57	0.01
Having relatives infected with COVID-19	0.40	–0.32–1.11	0.36	1.10	0.27
Interaction	1.96	0.99–2.92	0.49	4.02	<0.001
$R^2 = 0.15$					

**TABLE 6 |** Moderation effect of emotion regulation between DEC and concern about COVID-19.

Predictor	B	b 95% CI [LL, UL]	SE	t	p
(Constant)	4.19	4.10–4.29	0.05	90.09	<0.001
Emotion contagion	0.24	0.10–0.38	0.07	3.32	<0.001
Emotion regulation	–0.05	–0.14–0.04	0.05	–1.07	0.29
Interaction	–0.20	–0.30 to –0.11	0.05	–4.17	<0.001
$R^2 = 0.18$					

**TABLE 7 |** Moderation effect of having relatives infected with COVID-19 between parental burnout and stress.

Predictor	B	b 95% CI [LL, UL]	SE	t	p
(Constant)	2.45	2.26–2.63	0.09	25.88	<0.001
Stress	1.05	0.82–1.29	0.12	8.88	<0.001
Having relatives infected with COVID-19	–0.30	–0.94–0.35	0.33	–0.91	0.36
Interaction	0.98	0.26–1.70	0.36	2.70	0.01
$R^2 = 0.37$					

the effect of DEC on concern about COVID-19, suggesting a beneficial effect of ER. The full model explains 18% of the variance in parental contrast, with about 10% accounted for by the interaction term.

## DISCUSSION

This study showed that concern about COVID-19 predicted stress, depression, and parental burnout. These results align with findings of Koutsimani et al. (5), who found that people experiencing higher levels of anxiety are more prone to burnout. Likewise, we found parents who experienced higher levels of anxiety in response to COVID-19 and who believed they had higher possibility of being infected tended to experience higher levels of parental burnout in all four domains.

Anxiety is accompanied with intrusive thoughts and may lead to mental fatigue, becoming a risk factor that increases parental stress disturbing the balance between risks and resources described by the theoretical framework of parental burnout developed by Mikolajczak and Roskam (6). Thus, parents who experience higher levels of concern about the virus might benefit from using resources such as self-compassion practices and social

support to decrease anxiety and stress. This is especially true if they have relatives infected with COVID-19 because the virus becomes more personal to them, which may increase their illness anxiety (4).

Having relatives infected with COVID-19 increased the effect of stress on parental burnout along with the effect of DEC on parental burnout. It is possible that the personal experience of having the virus affect someone you know increases the anxiety about the COVID-19, which becomes an additional risk factor for parents exhausting their coping resources. The increased DEC effect on parental burnout when a parent has a relative infected with COVID-19 could be due to that a person may engage in excessive use of internet during pandemic. This is considering a safety-seeking behavior that people use to cope with illness anxiety (4). However, actively searching for virus-related information may become a risk factor for parents as it may trigger negative emotions due to DEC.

The current research showed that parental burnout is affected by susceptibility to emotion contagion. More specifically, DEC increased the impact of stress on two subscales of parental burnout: contrast and distancing. During quarantine in a Pandemic, ways to obtain social support are often limited to digital communication. This result means that the more parents are susceptible to take on other people's emotions on social media, the more they tend to feel that they are not as good parents as they used to be and that they are no longer able to make efforts for their children and can't do anything out of usual routines as parents. One of the explanations for the moderating role of DEC on the relationship between stress and contrast is that pandemic changed lives of parents. While completing the survey, they may, consciously or unconsciously, have compared pandemic parenting with pre-pandemic parenting and felt that they were not coping well enough during this crisis. De los Santos et al. (15) found that mothers on social media tend to express negative emotions more often than positive, thus, susceptibility to DEC of negative emotions makes a mother experience more anger, sadness, and fear herself. Regarding burnout related to perceived contrast, mothers may seek information about the expectations of motherhood and try to improve their confidence as mothers (14). However, when they compare themselves to other mothers and see that they are not doing as well as other parents, they may feel ashamed and think about their pre-pandemic parenting, which was different and up to their standards of a "good mother."

Distancing-related burnout involves difficulty doing anything out of standard routines, and it may be exacerbated by social media discussions between mothers when they express negative emotions about new responsibilities they need to fulfill in pandemic parenting. For instance, in Facebook mothers' groups, parents emotionally discuss how tired they are and how they are not planning to do extra work as parents because they have no energy to do so. DEC may then make other parents experience the same emotions. Paradoxically, these results may show that social media does foster a sense of connection among parents during the Pandemic, but this connection is not making them feel better, rather it leads to burnout through DEC. It may happen because negative emotions in general are more contagious among strangers (21, 22), amplifying shared stressful experiences (23).

Thus, when mothers on social media observe other mothers' struggles, they feel more stressed themselves through affective stress contagion (24). However, we do not know if participants used social media actively or passively. Passive use is more likely to be problematic, as Appel (17) showed passive usage decreases well-being and increases envy, leading to depression.

The results showed that a higher level of ER reduced the relationship between digital emotion contagion and concern about COVID-19, thus ER may have a positive effect on this relationship. This means that when parents use ER strategies after they become emotionally involved in DEC on social media, they tend to have lower anxiety about COVID-19. This result aligns with the research on cognitive reappraisal as an ER strategy. Parents could use cognitive reappraisal to change the meaning of the situation and improve their emotional experiences (38). For example, when a parent is navigating social media websites and starts feeling anxious about COVID-19 because other users are expressing fears, they could try to re-interpret the situation and/or change its meaning. An example of a cognitive reappraisal would be, instead of thinking, "this virus is going to kill me," they think, "I am using all the necessary precautions and the chance to get infected for me or my family is low." This relationship may reflect the awareness of DEC among study participants. They may have recognized that being on social media may make them prone to take on other people's emotions and, thus, they may have tried to regulate their feelings and decrease anxiety.

## LIMITATIONS AND FUTURE RESEARCH

An important limitation of the present study is the use of a cross-sectional design, in which participants completed the measures only once. Thus, we are unable to draw cause and effect relationships among the study variables. Future research should utilize longitudinal measures to study the relationships among anxiety, internet use, ER, and parental burnout. Another limitation is the limited size and diversity of the sample. We also did not include questions regarding parental communication in social media groups, and didn't ask how much time participants spend looking for information about COVID-19, these questions could have informed present research and would have made our discussion of findings more robust.

Future studies may focus on socio-demographic differences between parents of different races, ethnicities, and marital status. Additionally, researchers may want to investigate fathers' emotional experiences during the Pandemic and compare those with maternal feelings and behaviors. Another limitation is that only cognitive reappraisal and expressive suppression were assessed. Future projects may focus on the difficulties in ER, assessing broader range of ER strategies and techniques that parents use to cope with concern about COVID and burnout.

Qualitative interviews with parents exploring ways that they use social media could help to obtain an in-depth understanding of the function of social media in parental burnout, concern about COVID-19, and emotion regulation during pandemic. One of the factors that impacts DEC is activity vs. passivity of a social media user. Future studies could investigate the relationship

between activity and/or passivity on social media, the type of social media, DEC, ER, and burnout among parents.

## CONCLUSION

The present study explored the role of susceptibility to digital emotion contagion in the relationship between concern about COVID-19, stress, parental burnout, and emotion regulation. We found that parents who were more susceptible to digital emotion contagion were experiencing higher parental burnout when feeling stressed. Parents who used emotion regulation strategies when they experienced emotion contagion had lower anxiety about COVID-19. These data suggest that digital emotion contagion media affects experiences of stress and burnout in parents and that emotion regulation helps to mitigate these effects during a pandemic threat.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Social and Behavioral Institutional Review Board of Florida International University. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

AP developed and designed the methodology, conducted data collection, applied statistical techniques to analyze and synthesize the study data, prepared the published work, specifically writing the initial draft. HL applied statistical techniques to analyze and synthesize the study data, provided the analysis tool and prepared the published work, specifically with critical reviews, editing, and revisions. MW assisted in developing the research plan and data collection, and prepared the published work, specifically with critical reviews, editing and revisions. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Early Psychiatric Impact of COVID-19 Pandemic on the General Population and Healthcare Workers in Italy: A Preliminary Study

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**Introduction:** Since February 2020, the outbreak of COVID-19 spread to several countries worldwide, including Italy. In this study, we aimed to assess the psychopathological impact of the pandemic across the general population of Lombardy, the most affected Italian region, and to compare the prevalence of psychiatric symptoms between the general public and healthcare workers.

**Methods:** Four hundred and thirty-two participants completed an online survey including: the Depression, Anxiety and Stress Scale—21 items (DASS-21), the Impact of Event Scale—Revised (IES-R) and the Pittsburgh Sleep Quality Index (PQSI). Healthcare workers were also asked to complete the Maslach Burnout Inventory (MBI).

**Results:** At the DASS-21, 33.3% of the responders presented pathological levels of stress, 25.5% of anxiety, and 35.9% of depression. At the IES-R, 13.9% appeared at risk of developing Post-Traumatic Stress Disorder (PTSD). At the PQSI, 57.6% presented sleep disturbances. Female gender and younger age predicted higher scores of distress. Healthcare workers presented higher levels of psychiatric symptoms than the general public. Moreover, working in contact with COVID-19 patients predicted higher scores at the IES-R subscale Intrusion.

**Conclusion:** Our results showed that about a third of our sample presented symptoms of stress, anxiety, and depression during the first month of the COVID-19 pandemic outbreak in Lombardy; more than half of the responders presented sleep disturbances, and 13% appeared at risk of PTSD. Italian authorities should develop specific strategies to guarantee psychological support to the population of Lombardy, with particular attention to women, young people, and healthcare workers exposed to COVID-19 patients.

**Keywords:** COVID-19, SARS-CoV-2, stress, anxiety, depression, PTSD, sleep, healthcare workers

## HIGHLIGHTS

- We assessed psychiatric symptoms in Lombardy (Italy) during COVID-19 pandemic.
- A third of our sample presented symptoms of stress, anxiety, and depression.
- 13.9% appeared at risk of developing PTSD and 57.6% presented sleep disturbances.
- Healthcare workers presented higher levels of psychiatric symptoms.
- Working with COVID-19 patients predicted more Intrusion-type symptoms.

## INTRODUCTION

In December 2019, the city of Wuhan in China experienced an outbreak of atypical pneumonia caused by a novel betacoronavirus, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Since February 2020, the outbreak rapidly spread to several countries worldwide. The World Health Organization officially declared coronavirus disease 2019 (COVID-19) a pandemic on March 11th 2020. At the moment of writing, Italy is one of the most affected countries, with 201,505 total cases and 27,359 deaths. With 74,348 total cases and 13,575 deaths, Lombardy is arguably the most severely stricken Italian region. The rate of transmissibility suggested by the COVID-19 reproductive number has been estimated at around 4 (1), indicating that every infected person might transmit the infection up to 4 people. In order to limit the outbreak, Italian authorities ordered a strict quarantine at the beginning of March, along with a complete lockdown of the country. The COVID-19 outbreak and subsequent measures might represent two different, albeit interconnected, risk factors for the development of psychiatric symptoms in the general population and in the subpopulation of healthcare workers who are directly involved in the management and treatment of COVID-19 patients (2). Two recent Chinese studies reported psychological distress, insomnia, anxiety, and depressive symptoms in the general public and in healthcare workers during the outbreak (3, 4). At the time of writing, only one study assessed the emotional impact of COVID-19 in the Italian general public and reported psychological distress symptoms during the early phase of the COVID-19 outbreak in a vast proportion of patients (5). However, no available studies assessed the prevalence of specific psychiatric symptoms, such as depressive, and anxious symptoms, in the Italian population. Moreover, no studies have been specifically conducted on a sample of Italian healthcare workers.

The main aim of the present study was to evaluate the prevalence of specific psychiatric symptoms (stress, anxiety, depression, sleeping disturbances) across the general public of Lombardy during the first month of COVID-19 outbreak in Italy. We also assessed the same symptoms, along with burn-out level, in a specific cohort of healthcare workers. Finally, in both populations, we aimed to identify potential risk and protective factors contributing to the development of these symptoms. This might help Italian authorities to strategically plan the promotion of mental well-being.

## METHODS

This study is a cross-sectional survey, using an anonymous online questionnaire. A snowball sampling strategy was used to recruit a sample from the general public and one from healthcare workers. Data collection took place between 24th March and 31st March 2020. All participants signed an online written informed consent form before completing the questionnaire. The study was approved by the local Ethics Committee. Through the online questionnaire, demographic information was collected including age, gender, education level, and employment status; moreover, healthcare workers were requested to specify whether or not they were working in direct contact with COVID-19 patients and since how many days.

The survey included the following questionnaires.

The Depression, Anxiety, and Stress Scale—21 items (DASS-21), a strongly validated self-report questionnaire, assessing depressive, and anxiety symptoms (6). A Total Score was calculated as an index of general distress; moreover, the following three subscale scores were calculated: (i) Stress, averaging items 1, 6, 8, 11, 12, 14, 18; (ii) Anxiety, averaging items 2, 4, 7, 9, 15, 19, 20; (iii) Depression, averaging items 3, 5, 10, 13, 16, 17, 21. According to each subscale score, participants were labeled on a severity scale. Specifically, the subscale Stress score was divided into 0–7 (normal), 8–9 (mild), 10–12 (moderate), 13–16 (severe) and  $\geq 17$  (extremely severe); the subscale Anxiety score was divided into 0–3 (normal), 4–5 (mild), 6–7 (moderate), 8–9 (severe), and  $\geq 10$  (extremely severe); the subscale Depression score was divided into 0–4 (normal), 5–6 (mild), 7–10 (moderate), 11–13 (severe), and  $\geq 14$  (extremely severe). Pathological levels of either stress, anxiety, or depression were identified for participants who fell in the category of “mild” or above (7, 8).

The Impact of Event Scale-Revised (IES-R), a 22-item self-report scale that assesses subjective distress caused by traumatic events (9). The IES-R Total Score, obtained by summing the answers to each item, was divided into 0–23 (normal), 24–32 (mild psychological impact), 33–36 (moderate psychological impact), and  $>37$  (severe psychological impact). Although the IES-R is not used to diagnose Post Traumatic Stress Disorder (PTSD), a cut-off score of 33 has been previously considered to define patients at risk of PTSD (10); moreover, three subscales were calculated, providing an indication of the level of distress experienced: (i) Intrusion (averaging the responses of items 1, 2, 3, 6, 9, 14, 16, 20); (ii) Avoidance (averaging the responses of items 5, 7, 8, 11, 12, 13, 17, 22); (iii) Hyperarousal (averaging the responses of items 4, 10, 15, 18, 19, 21).

The Pittsburgh Sleep Quality Index (PSQI) (11), investigating the quality of sleep in the month before the assessment. Seven scales were calculated following the authors' instruction: (i) Subjective Sleep Quality; (ii) Sleep Latency; (iii) Sleep Duration; (iv) Habitual Sleep Efficiency; (v) Sleep Disturbances; (vi) Use of Sleeping Medications; (vii) Daytime Dysfunction; a Total Score was calculated summing the scores of the seven subscales. Participants scoring equal or above 5 at the Total Score were considered “bad sleepers.”

Finally, healthcare workers were also requested to complete the Maslach Burnout Inventory (MBI), a validated self-report measure of burnout. Burnout is defined by the ICD-11 as “a syndrome resulting from chronic workplace stress that has not been successfully managed” (12). The MBI provides an index for three aspects of burnout: Emotional Exhaustion (summing items 1, 2, 3, 6, 8, 14, 16, 20); Depersonalization (summing items 5, 10, 11, 15, 22); and Personal Accomplishment (summing items 4, 7, 9, 12, 17, 18, 19, 21). Even in this case, according to the score at each subscale, participants were labeled on a severity scale. Specifically, the subscale Emotional Exhaustion was divided into 0–18 (low), 19–26 (moderate),  $\geq 27$  (high); Depersonalization was divided into 0–5 (low), 6–9 (moderate),  $\geq 10$  (high); Personal Accomplishment was divided into 0–33 (high), 34–39 (moderate),  $\geq 40$  (low) (13).

Participants showing high levels of distress were contacted and encouraged to seek for psychological counseling.

## Statistical Analysis

Statistical analysis was performed using SPSS version 26 (Statistical Package for Social Science). The significance level was set at  $\alpha = 0.05$ , and all tests were 2-tailed.

A series of dichotomic variables was created according to the results of the psychometric questionnaires: participants who scored above the aforementioned cut-offs for each scale / subscale were labeled Clinical (1), and participants scoring below were labeled Not Clinical (0).

First, descriptive statistics were calculated for sociodemographic characteristics and for scales score.

Second, two categorical variables were created: (i) Group, dividing healthcare workers (HW) and general public (GP); (ii) COVID-19, dividing healthcare workers in contact (CHW) and not in contact (NCHW) with COVID-19 patients.

Mann-Whitney U test was run to assess differences amongst the groups (HW vs. GP, and CHW vs. NCHW) for the demographic variables and for the results at the questionnaires. Categorical variables were analyzed via Pearson Chi Square ( $\chi^2$ ) test. Finally, we used multiple linear regression analysis to calculate whether sociodemographic characteristics predicted the presence of psychiatric symptoms in three groups: (i) the whole sample; (ii) healthcare workers only; (iii) healthcare workers exposed to COVID-19 patients only.

Analytical code is available in **Supplementary Material 1**.

## RESULTS

### Demographic Features

A total of 432 valid questionnaires was retrieved. All responders were Italian and were living in Lombardy at the time of testing. Three-hundred and eleven responders (72%) were female and two (0.5%) preferred not to declare their gender. The mean age of the total sample was 35.9 ( $\pm 12.1$ ) years old, and mean education was 16.8 ( $\pm 2.8$ ) years. Sixty-six participants (15.3%) were students, 357 were employed (82.6%), one was unemployed (0.2%), and eight were retired (1.9%). In our sample, 123 (28.5%) were healthcare workers and 49 of them (39.9%) were working directly in contact with patients affected by COVID-19.

### Psychopathological Assessment

According to the DASS-21 subscales, 144 responders (33.3%) had pathological levels of stress, 110 (25.5%) of anxiety, and 155 (35.9%) of depression. At the IES-R Total Score, 60 participants (13.9%) appeared to be at risk of PTSD. Finally, 249 (57.6%) were found to be “bad sleepers” at the PSQI Total Score.

Within the HW group only, 59 responders (48%) presented pathological levels of stress, 47 (38.2%) of anxiety, and 51 (41.5%) of depression; 23 (18.7%) appeared to be at risk of PTSD according to the IES-R Total Score and 88 (71.5%) fell in the “bad sleepers” category at the PSQI Total Score. According to the MBI subscales, 47 (38.2%) healthcare workers presented high levels of emotional exhaustion, 49 (39.8%) of depersonalization, and 59 (48%) low levels of personal accomplishment.

Finally, within CHW only, 28 responders (57.1%) presented pathological levels of stress, 23 (46.9%) of anxiety, and 25 (51%) of depression; 11 (22.4%) appeared to be at risk of PTSD according to the IES-R Total Score and 35 (71.4%) fell in the “bad sleepers” category at the PSQI Total Score. According to the MBI subscales, 28 (57.1%) of healthcare workers presented high levels of emotional exhaustion, 24 (49%) high rates of depersonalization, and 21 (42.9%) low levels of personal accomplishment.

Further details are available in **Supplementary Material 2**.

### Healthcare Workers (HW) vs. General Public (GP)

Groups were balanced for gender [ $\chi^2(2) = 4.838, p = 0.089$ ] and age [U (432) = 21,249,  $p = 0.055$ ]; HW had a higher level of education than GP [U (432) = 24,952,  $p < 0.001$ ].

Significant differences emerged between the two groups at the DASS-21 Total Score [U (432) = 24,388,  $p < 0.001$ ] and at all the DASS-21 subscales: (i) Stress [U (432) = 24,483.5,  $p < 0.001$ ]; (ii) Anxiety [U (432) = 25,230.5,  $p < 0.001$ ]; (iii) Depression [U (432) = 21,619.5,  $p = 0.025$ ], all with HW scoring higher than GP.

Healthcare workers scored higher also at the IES-R Total Score [U (432) = 22,408.5,  $p = 0.004$ ] and at the IES subscales Intrusion [U (432) = 24,098,  $p < 0.001$ ], and Hyperarousal [U (432) = 21,519,  $p = 0.031$ ]. No difference was found at the IES subscale Avoidance ( $p > 0.05$ ).

Finally, significant differences were found at the PSQI Total Score [U (432) = 23,846.5,  $p < 0.001$ ] and at the following PSQI subscales: (i) Subjective Sleep Quality [U (432) = 22,546,  $p < 0.001$ ]; (ii) Sleep Duration [U (432) = 25,423.5,  $p < 0.001$ ]; (iii) Sleep Efficiency [U (431) = 21,308,  $p = 0.011$ ]; (iv) Daytime Dysfunction [U (432) = 21,644.5,  $p = 0.007$ ], all with HW scoring higher than GP (therefore having a worse sleep quality).

See **Table 1** for further details.

### COVID-19 Healthcare Workers (CHW) vs. Non-COVID-19 Healthcare Workers (NCHW)

Groups were balanced for gender [ $\chi^2(2) = 2.506, p = 0.286$ ], age [U (123) = 1,927,  $p = 0.555$ ], and years of education [U (123) = 1,807.5,  $p = 0.967$ ]

**TABLE 1 |** Sociodemographic and psychometric assessment.

	Whole sample			Healthcare workers		
	GP (N = 309)	HW (N = 123)	p	NCHW (N = 74)	CHW (N = 49)	p
Age, years, mean (SD)	35.91 (13)	36 (9.2)	0.055	35.7 (9.4)	36.5 (9.2)	0.555
Gender	94 M, 214 F, 1 Undeclared	25 M, 97 F, 1 Undeclared	0.089	13 M, 61 F	12 M, 36 F, 1 Undeclared	0.286
Years of education, mean (SD)	16.3 (3)	18 (1.9)	<b>&lt;0.001</b>	18 (1.9)	18 (1.8)	0.967
Time directly in contact with COVID-19 patients, days, mean (SD)	N/A	N/A	N/A	N/A	17.9 days (10.2)	N/A
DASS-21 total Score, score, mean (SD)	11.5 (9.3)	15.4 (9.2)	<b>&lt;0.001</b>	14.9 (9.9)	16.1 (8.2)	0.222
DASS-21 stress, score, mean (SD)	5.74 (3.9)	7.7 (4)	<b>&lt;0.001</b>	7.4 (4.1)	8.2 (3.9)	0.236
DASS-21 anxiety, score, mean (SD)	2 (3)	3.4 (3.2)	<b>&lt;0.001</b>	3.3 (3.4)	3.5 (3)	0.485
DASS-21 depression, score, mean (SD)	3.8 (3.7)	4.3 (3.3)	<b>0.025</b>	4.3 (3.5)	4.4 (3)	0.464
IES-R total score, score, mean (SD)	17.4 (12.8)	21.2 (12.1)	<b>0.004</b>	20.1 (13.7)	22.9 (14.8)	0.322
IES-R avoidance, score, mean (SD)	0.8 (0.6)	0.9 (0.6)	0.633	0.8 (0.6)	0.9 (0.6)	0.811
IES-R intrusion, score, mean (SD)	0.8 (0.7)	1 (0.8)	<b>&lt;0.001</b>	1 (0.7)	1.3 (0.8)	0.058
IES-R hyperarousal, score, mean (SD)	0.8 (0.7)	1 (0.8)	<b>0.031</b>	0.9 (0.8)	1 (0.8)	0.665
PSQI total score, score, mean (SD)	5.1 (2.7)	6.8 (3.6)	<b>&lt;0.001</b>	6.7 (3.7)	7 (3.6)	0.584
PSQI subjective sleep quality, score, mean (SD)	1 (0.6)	1.3 (0.7)	<b>&lt;0.001</b>	1.2 (0.7)	1.3 (0.7)	0.451
PSQI sleep latency, score, mean (SD)	1 (0.9)	1.2 (1)	0.149	1.2 (1)	1.2 (1)	0.982
PSQI Sleep Duration, score, mean (SD)	0.7 (0.8)	1.3 (1)	<b>&lt;0.001</b>	1.3 (1)	1.4 (1)	0.478
PSQI habitual sleep efficiency, score, mean (SD)	0.4 (0.7)	0.7 (1)	<b>0.011</b>	0.5 (0.9)	0.9 (1)	<b>0.012</b>
PSQI sleep disturbances, score, mean (SD)	1 (0.5)	1.1 (0.5)	0.211	1 (0.5)	1 (0.6)	0.644
PSQI use of sleeping medications, score, mean (SD)	0.3 (0.8)	0.4 (0.9)	0.165	0.5 (1)	0.3 (0.7)	0.298
PSQI daytime dysfunction, score, mean (SD)	0.7 (0.5)	0.9 (0.6)	<b>0.007</b>	0.9 (0.6)	0.9 (0.4)	0.702
MBI emotional exhaustion, score, mean (SD)	N/A	25.1 (12.1)	N/A	22 (9.7)	29.1 (13.7)	<b>0.008</b>
MBI depersonalization, score, mean (SD)	N/A	10.3 (5.2)	N/A	9.6 (4.7)	11.3 (5.8)	0.09
MBI personal achievement, score, mean (SD)	N/A	32.2 (9.4)	N/A	30.7 (9.4)	34.1 (9.2)	<b>0.051</b>

CHW, healthcare workers directly in contact with COVID-19 patients; DASS-21, Depression, Anxiety, and Stress Scale—21 items; GP, General Public; HW, healthcare Workers; IES-R, Impact of Event Scale-Revised; MBI, Maslach Burnout Inventory; N/A, Not Applicable; NCHW, healthcare workers not directly in contact with COVID-19 patients; PSQI, Pittsburgh Sleep Quality Index. Bold values mean  $p < 0.05$ .

No group differences were found at the DASS-21 Total Score, nor at the DASS-21 subscales. Similarly, no differences emerged at the IES-R Total Score and subscales. A trend toward

significance appeared for the IES-R subscale Intrusion [U (123) = 2,180,  $p = 0.058$ ], with CHW scoring higher than NCHW. CHW scored higher than NCHW at the PSQI subscale Habitual



Sleep Efficiency [ $U(122) = 2,210.5, p = 0.012$ ] and at the MBI subscale Emotional Exhaustion [ $U(114) = 2,058.5, p = 0.008$ ]; finally, a trend toward significance emerged at the MBI subscale Personal Accomplishment [ $U(114) = 1,932.5, p = 0.051$ ], with CHW scoring higher than NCHW.

See **Table 1** for further details.

## Regression Analysis

### Regression Analysis in the Whole Sample

The female gender was a predictor of the presence of psychiatric symptoms in terms of stress, anxiety, PTSD-like symptoms and sleep disturbances. In particular, the variable Gender was a predictor of: (i) the DASS-21 Total Score ( $p = 0.023$ ) and the DASS-21 subscales Stress ( $p = 0.03$ ) and Anxiety ( $p = 0.003$ ); (ii) the IES-R Total Score ( $p < 0.001$ ) and all the IES-R subscales [Avoidance ( $p = 0.032$ ), Intrusion ( $p < 0.001$ ), and Hyperarousal ( $p = 0.001$ )]; (iii) the PSQI subscales Subjective Sleep Quality ( $p = 0.003$ ), Sleep Latency ( $p = 0.02$ ), and Sleep Disturbances ( $p = 0.001$ ).

Symptoms of stress, anxiety and PTSD-like symptoms increased as age lowered; on the contrary, sleep disturbances increased with age. In particular, the variable Age was a predictor of: (i) the DASS-21 Total Score ( $p = 0.002$ ) and the DASS-21 subscales Stress ( $p < 0.001$ ) and Anxiety ( $b = -0.029; t = -2.39; p = 0.017$ ); (ii) the IES-R subscales Avoidance ( $p = 0.010$ ) and Hyperarousal ( $p = 0.025$ ); (iii) the PSQI Total Score ( $p = 0.002$ ) and its subscales Subjective Sleep Quality ( $p = 0.003$ ), Sleep Duration ( $p < 0.001$ ), and Use of Sleeping Medication ( $p < 0.001$ ).

Being a healthcare worker was a predictor of the presence of psychiatric symptoms in terms of stress, anxiety, PTSD-like symptoms and sleep disturbances. In particular, being a healthcare worker was a predictor of: (i) the DASS-21 Total Score ( $p < 0.001$ ) and its subscales Stress ( $p < 0.001$ ) and Anxiety ( $p < 0.001$ ); (ii) the IES-R Total Score ( $p = 0.032$ ) and its subscale Intrusion ( $p < 0.001$ ); (iii) the PSQI Total Score ( $p < 0.001$ ) and its subscales Sleep Duration ( $p < 0.001$ ), Habitual Sleep Efficiency ( $p = 0.004$ ) and Daytime Dysfunction ( $p = 0.02$ ).

None of the psychometric variables was predicted by responders' educational level.

### Regression Analysis Within the Healthcare Workers Group

Again, the female gender was a predictor of the presence of psychiatric symptoms in terms of stress, anxiety, PTSD-like symptoms, sleep disturbances and burnout. In particular, the variable Gender was a predictor of: (i) the DASS-21 Total Score ( $p = 0.008$ ) and its subscales Stress ( $p = 0.008$ ) and Anxiety ( $p = 0.001$ ); (ii) IES-R Total Score ( $p = 0.024$ ) and its subscales Intrusion ( $p = 0.033$ ) and Hyperarousal ( $p = 0.01$ ); (iii) the PSQI subscales Subjective Sleep Quality ( $p = 0.014$ ) and Sleep Disturbances ( $p = 0.023$ ); (iv) the MBI subscale Emotional Exhaustion ( $p = 0.044$ ).

Sleep disturbances were higher at a higher age. In fact, the variable Age was a predictor of the PSQI Total Score ( $p = 0.004$ ) and its subscales Sleep Duration ( $p = 0.004$ ), Habitual

Sleep Efficiency ( $p = 0.021$ ), and Use of Sleeping Medication ( $p = 0.006$ ).

Working directly in contact with COVID-19 patients was a predictor of the IES-R subscale Intrusion ( $p = 0.021$ ) and the MBI subscale Emotional Exhaustion ( $b = 7.245, t = 3.337, p = 0.001$ ), both with CHW presenting more symptoms of intrusion and emotional exhaustion than NCHW.

### Regression Analysis Within the COVID-19 Healthcare Workers Group

Gender was a predictor of the DASS-21 subscale Anxiety ( $p = 0.01$ ): in particular, female gender predicted the presence of anxiety.

Age was a predictor of the PSQI subscale Use of Sleeping Medication ( $p < 0.001$ ), with use of medication increasing with age.

The time (measured in days) spent directly in contact with COVID-19 patients was a predictor of the PSQI subscale Sleep Disturbances ( $p = 0.005$ ): sleep disturbances increased with the time spent with COVID-19 patients.

Further details, including statistical indexes, are available in **Supplementary Material 3**.

## DISCUSSION

In this study, we aimed to evaluate the prevalence of specific psychiatric symptoms across the general population and within a specific subsample of healthcare workers in the region of Lombardy, during the first month of the COVID-19 outbreak in Italy. Although we acknowledge that our findings might have been biased by the relatively small sample size and the majority of women in the sample, we strongly believe that our preliminary data should be taken into account as a first evidence of the psychological distress experienced by the population of Lombardy during the COVID-19 outbreak and the consequent lockdown measures. In particular, our data revealed an estimated prevalence of 25.5, 35.9, and 33.3% for symptoms of anxiety, depression, and stress, respectively. Moreover, 13.9% of the whole sample appeared to be at risk of developing PTSD. Our results are in line with those obtained both in the Chinese population, at the epicenter of the pandemic (3, 4), and in the general Italian population (5). In the first few weeks of the outbreak, Moccia et al. (5) reported that 38% of the Italian general population presented mild to severe psychological distress, which was related to specific temperament characteristics (cyclothymic, depressive, anxious) and adult attachment style. Here we expanded these findings by assessing specific psychiatric symptoms (anxiety, depression, stress, PTSD-like symptoms, and sleep disturbances); furthermore, we selected the population of Lombardy, the most affected Italian region with the largest number of infected people and deaths, accounting for almost half of all cases in Italy. Although the Italian population endured several traumatic events in the last decades (e.g., the series of earthquakes and tremors hitting central Italy since 2009), the entity of the current pandemic and measures taken by Italian authorities to contain the outbreak are unprecedented in the country's modern history. Our study provides an early insight on the psychopathological

impact of this phenomenon in a large sample of individuals. Moreover, this is the first study to investigate participants' quality of sleep and over half the sample (57.6%) was found to be a "bad sleeper" during the first month of the outbreak. Insomnia has previously been reported in several studies on mental health during quarantine, albeit with lower prevalence: Lee et al. (14) reported insomnia in 34.2% of residents at Amoy Gardens, the first officially recognized site of the SARS, 2003 community outbreak in Hong Kong; similar results were found the same year for inpatients with SARS in Canada (15) and for contacts of patients with Ebola in Senegal in 2014 (16). However, this is the first study to specifically assess sleep disturbances during the COVID-19 pandemic, and the high prevalence of bad sleepers might depend on the wide range of sleep disturbances assessed by the scale employed. Indeed, the PSQI is not restricted to insomnia but includes nightmares, feeling too hot or too cold while sleeping and sleep-related daytime disturbances.

We also identified predictors of high stress and psychiatric symptoms to provide indications for early psychological or psychiatric interventions. Our findings suggest that female gender represents a risk factor for the development of stress, anxiety, and sleep disturbances, together with PTSD symptoms Intrusion-type, Avoidance-type, and Hyperarousal-type. This finding, which is in line with studies conducted both in the context of previous epidemics (17) and in the context of the COVID-19 pandemic in China (4), suggests early interventions should be tailored for women. On one hand, higher age was found to be a protective factor for the development of stress, anxiety, depression and PTSD-like symptoms in our sample. On the other, it was found to predict a globally worse quality of sleep and an increased tendency to use sleeping medications. Taken together, these findings suggest that earlier interventions should be focused on younger individuals to address emotional distress and older ones for sleep disturbances.

In this study, we also compared the prevalence of symptoms between the general public and a subsample of healthcare workers in Lombardy. Similar studies have been conducted in the Chinese population during the outbreak of the COVID-19 pandemic (3, 18, 19) and in the context of other epidemics in the past, such as SARS in Canada in 2003 (10). Previous studies consistently reported a higher risk of developing psychiatric distress and sleep disturbances in HW, when compared to the general public [a review, see Brooks et al. (20)]. To the best of our knowledge, this is the first study to investigate the psychopathological impact of the COVID-19 pandemic on healthcare workers in Italy. Our findings are in line with the aforementioned studies, showing higher levels of stress, anxiety and depression than the general population, together with more PTSD-like symptoms (in particular, intrusion-type and hyperarousal-type) and sleep disturbances. Female gender was confirmed to be a predictor of (i) higher levels of stress and anxiety, (ii) PTSD symptoms of Intrusion-type and Hyperarousal-type, and (iii) sleep disturbances in this sample. Although any attempt to frame these preliminary findings should be considered speculative, the

gender inequality issues that dominate Italian society might have a role. Recent research has shown women healthcare workers to be discriminated in terms of salary and career progression (21). Furthermore, Italian welfare and social policy regimes often fail to address the needs of working women, who might experience a higher burden of distress during an unprecedented emergency that generates existential and collective uncertainty.

Furthermore, working directly in contact with COVID-19 patients appeared to be a predictor of the levels of Intrusion-type PTSD symptoms, regardless of the sociodemographic characteristics of healthcare workers, such as age and gender. The IES-R subscale Intrusion assesses the presence of repeated thoughts about the traumatic event (e.g., "Other things kept making me think about it." "Pictures about it popped into my mind." and "I had dreams about it."). Reynolds et al. (10) used the same instrument to assess the prevalence of PTSD in a group of healthcare workers operating against SARS in Canada in 2003; they found that the average score of healthcare workers at the Intrusion subscale was 0.7 ( $\pm$  0.9), similar to the one found in our sample of healthcare workers ( $1 \pm 0.8$ ). In this study, we further showed that even after controlling for sociodemographic characteristics such as age and gender, healthcare workers directly in contact with COVID-19 patients are most at risk of developing Intrusion-type PTSD symptoms. Among CHW, female gender predicted higher levels of anxiety and higher age predicted an increased use of sleeping medications. Interestingly, the time spent directly in contact with patients with COVID-19 was a predictor of the PSQI subscale Sleep Disturbances. This scale evaluates the frequency of different causes of sleep perturbation, such as: "cannot breath comfortably," "feeling too hot/too cold," "having bad dreams." It seems, therefore, that sleep disturbances increased with time spent with COVID-19 patients.

Finally, burnout levels were assessed within healthcare workers and compared between CHW and NCHW. High levels of Emotional Exhaustion and Depersonalization were presented, respectively, in 38.2 and 39.8% of the healthcare workers; furthermore, 48% of HW presented low levels of Personal Accomplishment, suggesting a worse satisfaction on the workplace and a sense of inadequacy about one's ability to relate to patients. CHW presented higher levels of Emotional Exhaustion, a scale describing the feeling of having no more emotional resources to cope with the situation at work (e.g., "I felt emotionally drained from my work"). This is in line with the findings of Marjanovic et al. (22), conducted on a group of nurses coping with the epidemic of SARS in Canada: they showed that a minor contact with SARS patients, together with a greater trust in the available equipment and in the infection control initiatives, predicted lower levels of emotional exhaustion.

Besides the small sample size and the majority of women, already mentioned at the beginning of the discussion, we acknowledge the following limitations: first, the use of an online survey did not allow the researchers to time the participants while administering it, to explain the study objectives directly and to debrief the participants;

second, the recruitment via snowball sampling strategy and the lack of a longitudinal follow-up might limit the generalizability of our results; third, we did not distinguish between people affected and not-affected by COVID-19, and we did not assess specific personality and psychological characteristics of our sample; thus, predictors of psychiatric symptoms could only be explored within the known sociodemographic characteristics of our sample (age, gender, years of educations).

## CONCLUSION

In conclusion, our results showed that about a third of our sample, recruited amongst inhabitants of Lombardy, Italy, presented psychiatric symptoms of stress, anxiety and depression during the first month of the COVID-19 pandemic outbreak; more than half of the responders to our survey presented sleep disturbances, and 13% appeared at risk of developing PTSD. Furthermore, younger age and female gender appeared to be risk factors for the development of psychiatric symptoms. These results might prove useful to Italian authorities that will strategically coordinate the promotion of mental well-being in upcoming months. Specific interventions tailored to the needs of healthcare workers, especially those directly exposed to patients with COVID-19, are also warranted.

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## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of ASST Santi Paolo e Carlo, Milan, Italy. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

BD, VN, and OG conceived and designed the experiment. BD and VN performed data collection. VN analyzed the data, under supervision of BD and AD'A. BD, VN, and AD'A wrote the manuscript. AP and OG revised the final manuscript. All authors approved the manuscript before submission. All authors contributed to the article and approved the submitted version.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2020.561345/full#supplementary-material>

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# SARS-CoV-2 and Asbestos Exposure: Can Our Experience With Mesothelioma Patients Help Us Understand the Psychological Consequences of COVID-19 and Develop Interventions?

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Since its emergence, the novel coronavirus disease of 2019 (COVID-19) has had enormous physical, social, and psychological impacts worldwide. The aim of this article was to identify elements of our knowledge on asbestos exposure and malignant mesothelioma (MM) that can provide insight into the psychological impact of the COVID-19 pandemic and be used to develop adequate interventions. Although the etiology of Covid-19 and MM differs, their psychological impacts have common characteristics: in both diseases, there is a feeling of being exposed through aerial contagion to an “invisible killer” without boundaries that can strike even the strongest individuals. In both cases, affected persons can experience personality dysfunction, anxiety, depression, and posttraumatic symptoms; helplessness, hopelessness, and projection of destructive thoughts onto external forces often emerge, while defense mechanisms such as denial, splitting, repression, and reduced emotional expression are used by individuals to contain their overwhelming anxieties. We believe that in both diseases, an integrated multidimensional intervention offered by hospitals and other public health services is the most effective approach to alleviating patients' and caregivers' psychological distress. In particular, we emphasize that in the context of both MM and COVID-19, Brief Psychoanalytic Group therapy can help patients and caregivers attribute meaning to the significant changes in their lives related to the experience of the disease and identify adaptive strategies and more realistic relational modalities to deal with what has happened to them. We also highlight the importance of developing a surveillance system that includes individual anamnestic evaluation of occupational risk factors for COVID-19 disease.

**Keywords:** COVID-19, mesothelioma, asbestos, psychological intervention, occupational risk

## INTRODUCTION

The novel coronavirus disease of 2019 (COVID-19) emerged at the end of 2019 in China and was classified as a pandemic by the World Health Organization [WHO] (2020a) on March 11, 2020. Since then, it has had an enormous impact on society, forcing health professionals to work long and exhausting shifts, researchers to close their laboratories, teachers to find new ways of delivering education, and workers to adapt to remote working if they have not lost their jobs (Castelnuovo et al., 2020). In many places, local authorities have had to take extreme actions to contain the spread of COVID-19, including lockdown of entire countries. The disease itself, fear of contagion, and measures to contain these have significantly affected people's occupational and social lives as well as their physical health and psychological well-being. The latter two specifically have been a major challenge for national health systems. In order to develop effective strategies to support patients and their families, it is critical to determine the impact of COVID-19 on their psychological well-being.

As professionals working in close contact with the health system and with specific expertise in contaminated areas across different scientific fields, we have been repeatedly asked whether our experience with exposure to various harmful substances and associated diseases—in particular, asbestos exposure, and malignant mesothelioma (MM)—can be useful for analyzing the psychological impact of COVID-19.

During our decade of work at Contaminated Sites, we have emphasized the need for an integrated approach to the care of patients with MM and their caregivers that involves clinical psychologists and psychotherapists with specific expertise in the field throughout the care process from diagnosis to therapeutic decision-making and up to the end of life (Granieri, 2015; Novello et al., 2016; Granieri et al., 2018). From this perspective, some of the authors have developed a psychological intervention termed Brief Psychoanalytic Group (BPG) therapy that consists of 12 1 h weekly therapeutic sessions for MM patients and their caregivers in the first months following diagnosis (Granieri et al., 2018). To date, this intervention has been implemented only in the National Priority Contaminated Site (NPCS)<sup>1</sup> of Casale Monferrato, a town in Northwestern Italy that is well-known for the high incidence of and mortality from MM among its residents. The high rates of mortality are associated with exposure to asbestos originating from the Eternit factory, one of the largest asbestos-processing companies in Europe (DeGiovanni et al., 2004; Ferrante et al., 2007; Bertolotti et al., 2008; di Orio and Zazzara, 2013). Our aim in developing BPG therapy was to establish a clinical model that can be adapted to different circumstances and diseases. Therefore, we have been asked whether this type of intervention can be successfully applied to COVID-19 patients as well as their caregivers.

The aim of this article was to identify elements from our findings on communities affected by asbestos exposure, and more specifically MM patients and their caregivers that can offer insight

into the psychological impact of the COVID-19 pandemic and guide the development of adequate psychological interventions.

## EPIDEMIOLOGIC DATA

The history of epidemiologic surveillance of COVID-19 and MM differs considerably. MM was identified as resulting from asbestos exposure in the 1970s, and its incidence has been monitored by means of a national registry established in the 1990s and implemented since 2002 that includes diagnosed cases since 1993. In contrast, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a novel virus whose health-related effects in humans were unknown until the emergence of the COVID-19 epidemic in China in late 2019. In Italy, nationwide epidemiologic surveillance of COVID-19 was established in January 2020.

Asbestos-related health effects are a major health concern in Italy, where about 3,748,550 tons of raw asbestos were used in a variety of industrial activities before it was banned in 1992. The Italian mesothelioma registry has documented more than 1,600 incident cases of MM per year and an annual standardized rate of the disease > 3 per 100,000 male inhabitants in recent years (Istituto nazionale per l'Assicurazione contro gli Infortuni sul Lavoro [INAIL], 2018). The median age at diagnosis in occupationally exposed males is 70.5 years, and the male-to-female (M/F) ratio is 2.6 (Marinaccio et al., 2018). The prognosis in MM remains poor. Occupational exposure to asbestos has been ascertained in most cases, and MM is the most prevalent occupational cancer, with an incidence and attributable fraction among cases ranging from 70 to 90% (Rushton et al., 2010).

Italy has one of the highest clinical burdens of COVID-19 in the world; as of November 12, 2020, there were 1,028,424 cases of infection and 42,953 associated deaths in the country (European Centre for Disease Prevention and Control [ECDC], 2020); 53,276 of these (18.39%) were healthcare workers (Istituto Superiore di Sanità [ISS], 2020a). Of all confirmed cases, the median age at diagnosis is 56 years and the M/F ratio is 1.2.

## MM AND COVID-19: DIFFERENCES AND SIMILARITIES IN ETIOLOGY

**Table 1** compares MM and COVID-19 symptoms. There are several differences but also some similarities between the two diseases in terms of etiology. One striking similarity is that both MM and COVID-19 are almost always associated with a specific causative agent—i.e., asbestos and SARS-CoV-2, respectively. We previously reported that many inhabitants of asbestos NPCSS besides patients and their families fear aerial contagion by an “invisible killer” (Guglielmucci et al., 2015; Granieri, 2016a). Indeed, occupational and environmental exposure to asbestos involves entire communities. As suggested in previous research, working at a Contaminated Site such as Casale Monferrato implies taking into account each inhabitant's unconscious representation(s) for choosing to continue residing in a place that is now recognized as potentially dangerous, their awareness of

<sup>1</sup>National Priority Contaminated Sites are areas identified based on analysis of contaminating agents as those that are a health and ecologic hazard, have an environmental impact, and cause damage to cultural and environmental assets (Legislative Decree 22/97; Ministerial Decree 471/99; Legislative Decree 152/2006).

being exposed to an environment contaminated as a result of a profit-driven logic, and the corruptive and collusive dynamics of the relationship with a factory that has for years contributed to the economic prosperity of the community (Borgogno et al., 2015; Granieri, 2016a, 2017). Inhabitants of NPCSSs can harbor intense feelings of guilt or shame, which increases the burden of an already traumatic situation. This is similar to the experience of the COVID-19 pandemic (Benziman, 2020; Nana et al., 2020) in which communities are fearful of contagion and worried about spreading the virus to their families, friends, or colleagues. The potential for each individual to be a vehicle of virus transmission can elicit blame, remorse, and regret. At the same time, people may engage in repulsive or isolationist behaviors toward those who are infected. Indeed, the way the community responds to a disease affects how people with the illness feel and behave: when an illness is viewed as something shameful, the affected person may experience more intense feelings of guilt and is at greater risk of social withdrawal.

Both MM and COVID-19 affect the respiratory system. The most common organ affected by MM is the pulmonary pleura, and its signs and symptoms include shortness of breath due to fluid around the lungs, abdominal swelling, chest wall pain, cough, and fatigue (Moore et al., 2010; American Cancer Society [ACS], 2016). Similarly, > 90% of COVID-19 cases hospitalized in Italy showed pneumonia and respiratory failure, with the most common symptoms being fever, dyspnea, cough, and fatigue (Brioni et al., 2020; Lomoro et al., 2020). However, the two diseases differ in their etiology. Asbestos fibers are released into the atmosphere and inhaled; although these may have a natural origin, anthropogenic activities are the predominant source of atmospheric asbestos fibers (International Agency for Research on Cancer [IARC], 2012). In contrast, SARS-CoV-2 is a virus that is transmitted through direct contact with respiratory droplets of an infected person that are expelled through speaking,

coughing, and sneezing. Less frequently, infection can occur through contact with a surface contaminated with the virus (Li Q. et al., 2020; Rothe et al., 2020).

This highlights one of the most significant differences between MM and COVID-19. The former is non-contagious and is associated with environmental or, more frequently, occupational exposure to asbestos and primarily affects workers in asbestos-cement plants and other industrial settings (Vimercati et al., 2019; Catelan et al., 2020). However, MM can also affect anyone living in an asbestos NPCSS or who comes into contact with asbestos fibers carried by another person (e.g., in a domestic context such shared living quarters). Indeed, MM has been diagnosed in wives/relatives of workers who were occupationally exposed to asbestos through inhalation of fibers attached to surfaces and contaminated clothes and handling of asbestos waste (Ferrante et al., 2007; Noonan, 2017). This can lead to a feeling of danger in relationships, particularly within a family (Granieri et al., 2018; Padilha Baran et al., 2019). Living in an environment where the risk of exposure to the toxic agent is omnipresent, together with the awareness of the large number of victims and outcome of MM, can cause individuals to enter a state of social and emotional detachment (Guglielmucci et al., 2014; Kozlowski et al., 2014), which is similar to the feelings aroused by COVID-19.

COVID-19 is a transmissible disease that is mostly linked to exposure in living environments, especially indoor and crowded places (Parvin et al., 2020; Zhao et al., 2020). In some cases, adult sons or daughters are responsible for infecting their parents, who are more likely to have fragile health (Mapelli, 2020). From a clinical standpoint, this can lead to the feeling of being a harbinger of death, especially in those who have infected elderly parents; this is similar to what we have encountered in many MM patients living in asbestos NPCSSs, who report being stigmatized as a “plague spreader” by the community and experiencing feelings of intense guilt for having contaminated their families by transporting a toxic agent from the workplace into their home (Guglielmucci et al., 2018; Wang et al., 2020).

COVID-19 is an ongoing challenge for occupational health (Burdorf et al., 2020), with several work environments associated with high risk of viral transmission. During the epidemic, the Italian National Workers Compensation Authority (INAIL) introduced the notion of work-related SARS-CoV-2 infection as an occupational injury and processed compensation claims from workers all over the country including healthcare and public administration workers, nursing home staff, and workers in other economic sectors. In the case of COVID-19 but not MM, the occupational source of the disease is primarily related to the provision of care to affected patients (Roggli et al., 2002; Koh, 2020; Lewandowski, 2020; Ng et al., 2020). Exposure to SARS-CoV-2 varies according to the work environment and the employee’s occupational role (Bai et al., 2004; Brooks et al., 2018). Healthcare workers have very high exposure to the virus as they are in constant contact with infected individuals, making theirs a high-risk occupation in terms of the impact on their mental health, especially during a pandemic (Bai et al., 2004; Maunder, 2004; Chen et al., 2005; Maunder et al., 2006; Wu et al., 2009; Hamouche, 2020; Ho et al., 2020; Huang and Zhao, 2020; Huang et al., 2020; Koh, 2020; Xiang et al., 2020; Zhu et al., 2020).

**TABLE 1 |** Comparison between COVID-19 and MM symptoms.

Symptoms	COVID-19	MM
Fever	✓	✓
Dry cough	✓	✓
Loss of smell and taste	✓	✓
Headaches	✓	✓
Aches, muscle pains	✓	
Sore throat	✓	✓
Fatigue	✓	✓
Chills, repeated shaking	✓	
Diarrhea, vomiting	✓	✓
Runny nose	✓	
Sneezing	✓	
Weight loss		✓
Dyspnea	✓	✓
Chest pain	✓	✓
Swallowing difficulties	✓	✓
Back Pain		✓

American Society of Clinical Oncology (2017) and World Health Organization [WHO] (2020b).

Despite their distinct etiologies, MM and COVID-19 may have a similar psychological impact on individuals: inhabitants of asbestos NPCSSs often report a feeling of being exposed without protection to a threat in their living environment while in a broader sense, a virus such as SARS-CoV-2 does not have any geographic boundaries (Granieri, 2016a; Consumer News and Business Channel [CNBC], 2020) as anyone can be infected, and there can be a new infection or death at any moment of any day (Lazzerini and Putoto, 2020; Montemurro, 2020). The idea of a “phantom of death” that can strike even the strongest person has been expressed by inhabitants of asbestos NPCSSs (Granieri, 2016a). This is still relevant to COVID-19, although it is less deadly than MM and is most lethal in vulnerable populations. Thus, some people who have not contracted COVID-19 consider their home as their only refuge, and it remains so only through avoidance of all contact with the outside world. This can lead to a self-confinement that persists even after the lockdown imposed by authorities is lifted (Banerjee and Rai, 2020).

Another important difference in the etiologies of MM and COVID-19 is that asbestos is linked to industrial production and human activities, whereas SARS-CoV-2 is an infectious agent with a natural origin. Humans are facing an increasing number of contaminants associated with manufacturing (Goldsteen and Schorr, 1982; Cline et al., 2008, 2014). Epidemics related to pathogens such as viruses or bacteria are an archaic threat but are unexpected and frightening, especially in Western countries. While asbestos exposure can be blamed on specific people or interests, the same is not true for COVID-19. A calamity without anyone to hold responsible is difficult to accept, and when it cannot be attributed to a known source, people tend to protect themselves from their fears and sense of helplessness by ascribing the problem to a more familiar and controllable cause out of a psychological need to identify a culprit. This can include scientific laboratories, China, 5G, governments, the healthcare system, God, or even other people who do not behave as they think appropriate for containing the spread of the virus. In this context, myths and misconceptions (“fake news”) about COVID-19 have emerged especially on the internet, which has fueled anxiety among people (Barreneche, 2020), forcing national and international public health agencies to counter the propagation of misinformation by refuting false claims and communicating correct information (Italian Ministry of Health [IMH], 2020; Istituto Superiore di Sanità [ISS], 2020b; World Health Organization [WHO], 2020a,b).

There are important similarities and differences between MM and COVID-19 in terms of the affected populations and disease onset time. The interval from exposure to asbestos to the development of symptoms in MM is on average  $\geq 40$  years; as such, this cancer mainly occurs in adults and older people (Marinaccio et al., 2007; Barone-Adesi et al., 2012; Reid et al., 2014). In contrast, people of any age can be infected with COVID-19, although older people are more vulnerable (Niu et al., 2020). Thus, older people have a higher risk of both diseases, but with a fundamental difference in timing: MM has a long latency period, whereas the latency of COVID-19 ranges from a few days to 2 weeks (Lauer et al., 2020). A diagnosis of either disease can be traumatic, but the trauma of COVID-19 is current while

that of MM is rooted in the past—i.e., people are paying the price for decisions that were made and events that unfolded many years prior.

Workers can limit their exposure to asbestos by using personal protective equipment (e.g., masks, gloves, and suits); additionally, the risk of exposure for workers and the general public can be minimized by providing information and promoting awareness of the health-related effects and through compliance with Italian law 257/1992 and related legislation that prohibits production involving asbestos and requires the implementation of asbestos remediation processes. The spread of COVID-19 can likewise be limited by providing information on the risks and health-related effects, thereby increasing public awareness of preventative measures and promoting the adoption of health-protective individual behaviors (e.g., hand-washing, wearing personal protective equipment, and social distancing and restrictions to outdoor gatherings) (Hellewell et al., 2020; Liu et al., 2020; Xu et al., 2020). However, these measures undermine a fundamental need of humans to socialize and engage in relationships, as well as norms of reciprocity, social trust, and support; they also require individuals and communities to utilize adaptive resources that rely on bonding, bridging, and linking aspects of social capital to respond to public health threats (Szreter and Woolcock, 2004) and pandemics (Chuang et al., 2015; Pitas and Ehmer, 2020). Although digital technology may enable the preservation of social connections during physical distancing, complete physical isolation (which can be quarantine or shielding in some contexts) can affect people’s emotional well-being and sense of self and life purpose (Brioni et al., 2020).

Various drugs have been tested for the treatment of MM, but to date there is no cure and the prognosis is poor. Vaccines for COVID-19 are under development but are not yet available. However, it should be noted that the mortality rate of COVID-19 is around 10%; that is, patients recover in most cases.

## PSYCHOLOGICAL IMPACT OF ASBESTOS EXPOSURE AND SARS-CoV-2 INFECTION

### Factors Negatively Affecting Mental Health

Asbestos exposure as well as SARS-CoV-2 infection has lasting and negative consequences for both physical and mental health (Taylor et al., 2008; Guglielmucci et al., 2015; Adhanom Ghebreyesus, 2020). Psychological effects of MM and COVID-19 are observed not just in patients and caregivers, but in the entire exposed population (Table 2).

### Asbestos Exposure

For the general population living in NPCSSs, the traumatic experience is linked to the workplace but affects the entire community because of the hazards associated with their living place. People who have experienced this type of collective trauma exhibit personality dysfunction, anxiety, and depression, as well as an increased frequency of dissociative experiences,



**TABLE 2 |** Psychological impact of COVID-19 and MM on exposed population, affected patients, and their caregivers.

Psychological impact	COVID-19			MM		
	Exposed population	Patients affected	Caregivers	Exposed population	Patients affected	Caregivers
Depression	44.1% <sup>k</sup>	29.2% <sup>p</sup>	62.5% <sup>e,r</sup>	<sup>v</sup> b,c	19% <sup>o</sup>	<sup>v</sup> b,c,h
Anxiety	32.4% <sup>k</sup>	20.8% <sup>p</sup>	20.5% <sup>e</sup>	<sup>v</sup> b,c	32% <sup>o</sup>	<sup>v</sup> b,c,h
Stress	37% <sup>k</sup>		36.4% <sup>e</sup>	<sup>v</sup> b	39.8% <sup>o</sup>	<sup>v</sup> b,c,h
Fear	<sup>v</sup> i	<sup>v</sup> i		<sup>v</sup> b,c	<sup>v</sup> g	
Worries	<sup>v</sup> i	<sup>v</sup> i				
Anguish	<sup>v</sup> i	<sup>v</sup> i	<sup>v</sup> e	<sup>v</sup> b,c	<sup>v</sup> g	<sup>v</sup> b,c
Fatigue	<sup>v</sup> n		<sup>v</sup> e	<sup>v</sup> b,c		
Loneliness	35.86% <sup>i,l,p</sup>	35.86% <sup>i</sup>				
Social withdrawal	<sup>v</sup> a,i			<sup>v</sup> b	<sup>v</sup> g,c,b	<sup>v</sup> b,h
Difficulty of adaptation	<sup>v</sup> f,j	<sup>v</sup> i			<sup>v</sup> g,c	
Hopelessness					<sup>v</sup> g,b	<sup>v</sup> h,c
Intrusive thoughts					<sup>v</sup> b,c	
Uncertainty	<sup>v</sup> f	<sup>v</sup> i		<sup>v</sup> b,c	<sup>v</sup> b,c	<sup>v</sup> b,c
Loss of control	<sup>v</sup> i	<sup>v</sup> i	<sup>v</sup> e	<sup>v</sup> b	<sup>v</sup> g	<sup>v</sup> b
Compromised sense of belonging	<sup>v</sup> i	<sup>v</sup> i				
Somatization	7.4% <sup>m,q</sup>	7.4% <sup>m,q</sup>		<sup>v</sup> b	<sup>v</sup> c	<sup>v</sup> b,h

<sup>a</sup>Banerjee and Rai (2020), <sup>b</sup>Bonafede et al. (2018), <sup>c</sup>Bonafede et al. (2020), <sup>d</sup>Burhamah et al. (2020), <sup>e</sup>Dhiman et al. (2020), <sup>f</sup>Furlong and Finnie (2020), <sup>g</sup>Hughes and Arber (2008), <sup>h</sup>Kleine et al. (2019), <sup>i</sup>Li and Wang (2020), <sup>j</sup>Monterrosa-Castro et al. (2020), <sup>k</sup>Odriozola-González et al. (2020), <sup>l</sup>Rubin and Wessely (2020), <sup>m</sup>Shangguan et al. (2020), <sup>n</sup>Townsend et al. (2020), <sup>o</sup>Ugalde et al. (2012), <sup>p</sup>Xiang et al. (2020), <sup>q</sup>Zhang J. et al. (2020), <sup>r</sup>Zhong et al. (2020).  
*V* = Aspects cited, but without prevalence percentage.

somatization, and enactment entailing many somatopsychic features (Borgogno et al., 2015; Granieri, 2016a; Colizzi et al., 2020). People living in NPCSS have had to find a balance between immunitas (isolation and enclosure within one’s own identity boundaries to protect oneself from contamination by others) and communitas (opening up one’s life to others and facing the fear of contagion in the encounter with the other’s specificity) (Granieri, 2013, 2016b; Guglielmucci et al., 2015). One study of MM patients found that 32% had clinical or subclinical anxiety, 19% had depression, and 39.8% reported stress (Ugalde et al., 2012). In particular, psychological distress was linked to “Dealing with concerns about your family’s fears and worries” (62%). Social isolation resulting from depression, apathy, and stigma is an issue faced by patients and caregivers (Hughes and Arber, 2008; Guglielmucci et al., 2018). MM patients reported a high level of frustration and emotional distress in reaction to physical symptoms (Hughes and Arber, 2008). MM has a unique psychosocial impact because of the high symptom burden, incurability, rarity, and asbestos-related etiology (Bonafede et al., 2018). Awareness of the work-related origin of the disease leads to specific forms of emotional distress in MM patients such as anger, anguish, and worry, along with a sense of guilt for having risked their families’ health (Braun and Kisting, 2006; Guglielmucci et al., 2014). These negative emotions are difficult to express, and MM patients—as well as other people who are exposed to asbestos—may experience loss of their sense of belonging and control (Guglielmucci et al., 2018).

**SARS-CoV-2 Infection**

A pandemic can place a severe strain on society’s mental health resources, potentially leading to untreated mental health issues

(Douglas et al., 2009; Banerjee, 2020; Yang et al., 2020). Fear of infection is a common reaction to pandemics; the possibility of infection can cause pervasive worry over one’s health and potential to infect others, especially family members (Bai et al., 2004; Desclaux et al., 2017). People in high-transmission areas may exhibit personality dysfunction, anxiety, and depression, and somatic disorders may be exacerbated by the intense fear of infection (Mohammed et al., 2015; Ornell et al., 2020; Vigo et al., 2020; Xing et al., 2020). Symptoms of posttraumatic stress disorder or complicated grief disorder are also sequelae of global emergencies or disasters (Eisma et al., 2019, 2020; Colizzi et al., 2020; Fekih-Romdhane et al., 2020; Tang et al., 2020). Mental health issues during a pandemic are related to the adverse effects of prolonged social distancing, social isolation, and quarantine, and the illness and loss of loved ones (Garety et al., 2001; Wang et al., 2017; Bao et al., 2020; World Health Organization [WHO], 2020c). Stress, anxiety, depression, and insecurity have emerged over the many months of the COVID-19 pandemic, even in non-infected individuals (Duan and Zhu, 2020); the overall prevalence of depressive symptoms, anxiety, and stress symptoms among adults was found to be 44.1, 32.4, and 37%, respectively (Odriozola-González et al., 2020). Anxiety can be accompanied by feelings of anguish, social isolation, panic, and irritation; inability to concentrate; and sleep disturbance (Monterrosa-Castro et al., 2020). One study reported that 7.4% of the population showed various somatic symptoms related to chronic stress caused by the COVID-19 pandemic (Zhang J. et al., 2020). Unemployment, uncertainty, distress, the increasing death toll, and restrictions imposed by lockdown can cause a strain on mental health (Banerjee and Rai, 2020). Higher rates of psychological symptoms such as emotional disturbance,

depression, and posttraumatic stress were reported in people under quarantine than in those who had not been quarantined (Brooks et al., 2020). Moreover, in the case of mass quarantine, social isolation, worry, and an inability to tolerate distress can exacerbate anxiety and feelings of being trapped and losing control (Rubin and Wessely, 2020).

Although a pandemic affects the entire population, individuals who have experienced potentially traumatic events such as a threat to one's own health or loss of a loved one or their livelihood have a higher risk of developing mental health problems (Inchausti et al., 2020; Li Z. et al., 2020; Lima et al., 2020; Sritharan and Sritharan, 2020). Even families who have not been in direct contact with SARS-CoV-2 may experience indirect effects of the pandemic (Van Bavel et al., 2020). The drastic change in daily habits and restrictions on movement and activities in order to limit virus transmission may enhance worry and insecurity. Families are more likely to experience increasing social isolation, which may further exacerbate distress and increase susceptibility to stress, which can have harmful effects on both mental and physical health (Hawkey and Cacioppo, 2010). With the pervasive news coverage of the exponential spread of COVID-19, some people may wonder whether they or a loved one will inevitably contract or even die from the virus (Bertuccio and Runion, 2020; Wallace et al., 2020). An increased prevalence of depression (29.2%) and anxiety (20.8%) was observed in patients who had experienced COVID-19 infection (Zhang J. et al., 2020), and the incidence of fatigue 10 weeks after initial COVID-19 symptoms was 52.3% (Townsend et al., 2020). Patients may be fearful of the consequences of the infection, and those in quarantine may experience boredom, loneliness, and anger (Xiang et al., 2020). The rate of loneliness in a sample of people exposed to and affected by COVID-19 was reported to be 35.86%, and people who had COVID-19-related symptoms were more likely to develop psychiatric disorders and experience loneliness (Li and Wang, 2020).

For most individuals, the COVID-19 crisis has become a new normal. People are often confined in their homes in some cases unable to work and may feel cut off from close friends and family. The extreme social restrictions as well as the emergency situations that healthcare professionals face daily require that individuals make psychosocial adjustments to the long-lasting and substantial impact of the disease on their lives. Distress and loneliness can profoundly affect people's perception of events (Murthy, 2017; Berg-Weger and Morley, 2020; Cerami et al., 2020; Zandifar and Badrfam, 2020). A recent study showed that health professionals working to fight COVID-19 were more severely affected by mental health issues (Dai et al., 2020; Lai et al., 2020; Zhang W. et al., 2020; da Silva and Neto, 2021) and indirect traumatization (Li Z. et al., 2020) than other occupational groups.

## Caregiver Burden

A diagnosis of MM often requires the intervention of a family member, who assumes the role of caregiver and represents the support structure for the patient through the various stages of the disease (Hughes and Arber, 2008). This requires a radical reassessment of the primary needs within the family and can involve drastic changes in daily activities, work, and

relationships and reformulation of roles within the family. Such conditions can lead to significant distress (Maguire, 1985; Frank, 1991). Caregivers of MM patients are prone to experiencing depression, anxiety, hopelessness, somatic symptoms, social isolation, and financial stress (Adelman et al., 2014; Kleine et al., 2019). It was recently shown that caregivers of MM patients were more severely traumatized than the patients themselves, reporting higher frequencies of intrusive thoughts about death and exhibiting physiologic hyperactivation (Bonafede et al., 2020). The risk of depression is associated with use of avoidance strategies in caregivers, with a higher risk in females as compared to males (Bonafede et al., 2020).

The COVID-19 pandemic is already exacerbating caregiver responsibilities especially among women, with schools and childcare centers preventatively closed nationwide (Graves, 2020). Caregivers of COVID-19 patients face many challenges (Gulia et al., 2020). A recent study showed that long-term caregivers were more likely than short-term caregivers to have had a mental health condition prior to the COVID-19 pandemic, and both groups were more likely than non-caregivers (Park, 2020). Long-term caregivers also developed more somatic symptoms, and the rates of depression, anxiety, and stress symptoms in this group were 62.5, 20.5, and 36.4%, respectively (Dhiman et al., 2020). Psychological distress in caregivers is also exacerbated by social distancing and restrictions to individual mobility and social activities, as low social support is associated with higher levels of worry and depression (Zhong et al., 2020).

## Effects of Isolation

Isolation and social distancing have affected MM and COVID-19 patients in different ways. As noted above, MM patients often report feeling stigmatized as "plague spreaders" by the community (Granieri, 2013; Guglielmucci et al., 2014), and their caregivers also experience social isolation. The COVID-19 pandemic has added a new dimension to this isolation both at home and in hospitals. In order to prevent transmission, COVID-19 patients are usually admitted to a separate ward from other hospitalized patients and face a prolonged period of quarantine after discharge. Patients often die alone, and family members are alone in their mourning, without the possibility of experiencing the moments of death and the start of the mourning process. In some instances, people have been cremated because of a lack of space even if this was not their wish before their death, such that relatives were deprived of the last chance to see their loved one's body in repose. In other cases, people have been buried wearing only a white sheet, reminiscent of past ages when life was given a lesser value. The negative psychological repercussions of isolation are further complicated by the fact that people in need do not always seek help if they perceive that experiencing pain after a collective traumatic experience or after isolation is common (Meda and Slongo, 2020; Samson, 2020).

## Defense Mechanisms

Common responses to traumatization—which depend on the mind's degree of integration and quality of functioning—range

from a frozen affective internal state based on dissociation and denial, to resilient behaviors developed following exposure to the traumatizing event (Granieri et al., 2018; Bonafede et al., 2020). Defense mechanisms in inhabitants of asbestos NPCSS are mainly aimed at maintaining, protecting, modifying, or repairing the shared group identity. Denial, splitting, repression, and reduced emotional expression allow individuals to contain their overwhelming anxiety and profound feelings of shame and guilt associated with the fact that they have accepted something dangerous to themselves and their families (Granieri, 2016b). Indeed, although asbestos production had many benefits, in time it became evident that it endangered the population and would continue to harm those residing in the NPCSS (Guglielmucci et al., 2014). Inhabitants of asbestos NPCSS often direct their rage toward asbestos, institutions, delays in diagnosis, experimental protocols, or the complicated process of applying for financial compensation (Guglielmucci et al., 2015, 2018). This projection of destructive feelings onto external objects is a self-protective measure against internally directed anger (e.g., frustration at being incapacitated as a result of the disease, fear of impending mourning and death, or the feeling of not being understood) or attempts to conceal feelings of deep depression (e.g., discouragement, sadness, and helplessness) (Granieri and Borgogno, 2014; Granieri, 2015; Granieri et al., 2018). It is likely that that people exposed to asbestos and SARS-CoV-2 experience similar feelings of helplessness and hopelessness and have aggressive cogitations directed toward the source of the trauma. As in the case of inhabitants of asbestos NPCSS, during a pandemic people rely on defense mechanisms such as denial, splitting, repression, reduced emotional expression, and a frozen affective state. For example, at the time of writing this article, some people were still denying the risk of COVID-19 and refused to adhere to government-ordered protective measures. On the contrary, others are so fearful that they have adopted obsessive-compulsive defenses (i.e., cancelation) to avoid infection. The rapid evolution of the pandemic (Cucinotta and Vanelli, 2020), lockdown measures (Wilder-Smith and Freedman, 2020), and reports of fatal outcomes (Onder et al., 2020) may unintentionally encourage societal over-concern, which can degenerate into heightened anxiety and stress responses and the development of fictitious symptomatology, leading to misguided health-protective and help-seeking behaviors (Garfin et al., 2020).

## Experience of MM Patients During the COVID-19 Pandemic

The British Thoracic Society recently published recommendations on COVID-19 and lung cancer/mesothelioma (British Thoracic Society [BTS], 2020). As the latter patients are at risk of a fatal outcome if they contract COVID-19, particularly strict restrictions to their movements and social interactions are necessary. This can magnify the sense of isolation that they experience as MM patients, resulting in not just an additive but a synergistic interaction between the impact of their existing disease and that of the measures they have to follow to prevent another potentially fatal disease (Golden, 2020; Mannino, 2020).

## PSYCHOLOGICAL INTERVENTIONS IN RESPONSE TO COVID-19 BASED ON EXPERIENCES WITH MM PATIENTS AND THEIR CAREGIVERS

Specific preventive strategies at the community level must be provided to mitigate the psychological and psychosocial impact of the COVID-19 pandemic. Our experience with MM patients and their caregivers has highlighted the need for an integrated intervention that restores in patients a sense of control over and responsibility for their health and treatment and reduces psychological distress in both patients and caregivers, while providing them with strategies to actively face the disease (Granieri, 2015). This is also important for addressing the COVID-19 pandemic (Orrù et al., 2020; Salari et al., 2020).

Psychoanalysis has been increasingly focused on large-scale disasters (e.g., natural catastrophes, pandemics, accidents, war, and so on) and their devastating physical, psychological, and relational impacts (Rosenbaum and Varvin, 2007; Boulanger et al., 2013; Granieri, 2016a), with therapeutic techniques adapted to specific contexts without overshadowing the basic theoretical model (Ferenczi, 1928). The BPG intervention designed by some of the authors of this paper for MM patients and their caregivers in the asbestos NPCSS of Casale Monferrato (Granieri et al., 2018) can also be applied to COVID-19 patients.

We believe that BPGs can be particularly useful in those situations where very intense feelings compromise the possibility to give meaning to the experience of the disease. In both the context of MM and COVID-19, we propose that BPG interventions can help patients and their caregivers give meaning to the significant changes in their lives connected to the experience of the disease and the therapies, allowing them to identify more adaptive strategies and more realistic relational modalities to deal with what has happened to them.

BPG therapy consists of 12 1-h weekly group sessions led by two psychoanalytically oriented psychotherapists with specific expertise in this field. The time-limited intervention was designed for the first months following diagnosis, given that this period is characterized by intense traumatization, disintegration, splitting, and posttraumatic stress (Arber and Spencer, 2013; Guglielmucci et al., 2018), and considering the limited life expectancy and rapid deterioration of health of MM patients after the diagnosis. Similarly, the traumatic experiences of COVID-19 patients and caregivers related to the disease, quarantine, and care process must be addressed as soon as possible, even though video conferencing, given the physical condition of affected patients.

In both MM and COVID-19, the traumatic experiences of patients have an impact on caregivers. Thus, an intervention aimed at both groups may reveal unconscious processes connected to the overwhelming impact of the disease and the death anxieties aroused. Patients and caregivers are encouraged to project the traumatic emotions they are experiencing and can be helped in elaborating what is happening to them, in facing the fear of loss and death, and can receive help in translating their dissociated traumatic experience into thoughts and words (Granieri, 2016a, 2017; Granieri et al., 2018). Moreover, the

presence of other families with different psychological and relational characteristics allows participants to experience within the group that there are different strategies and processes—which may be more or less mature or dysfunctional—for managing the disease, as well as their physical and psychological consequences (García Badaracco, 2000; Granieri and Borgogno, 2014). Finally, co-conduction of the sessions by two psychotherapists with a specific clinical and professional expertise ensures greater focus on unconscious emotional content and simultaneous consideration of the intrapsychic, intrafamily, and interpersonal dynamics of the group.

BPG therapy progresses through different phases, each with specific aims (Granieri et al., 2018). In the initial phase (sessions 1–3), clinicians explore through narratives shared with the group how people relate to an ill body and its new needs, as well as anxieties and unconscious affect related to the danger of living in a contaminated site. In this phase, the co-conductors help the group identify a shared and recurring topic [somatopsychic focus (SPF)], a shared image/metaphor that links physical symptoms with emotions, feelings, and fantasies. In the central phase (sessions 4–8), the co-conductors help the group address the SPF through recognition of feelings and fantasies and their connection to their daily life experiences such as physical symptoms and medical treatments. Finally, the concluding phase (sessions 9–12) helps the group reconsider the narrative of the disease including its development among members, eventual absences or deaths, emotions shared with the group, and strategies used to face the disease. Additionally, the group explores fantasies about the end of the therapy and identifies what each member will take away from the work that was done during the sessions.

Under traumatic circumstances, the flow of time can sometimes collapse, leaving the individual stuck in the traumatic event and prematurely withdrawing from a life that has lost its appeal and attractiveness, becoming a sort of black-and-white photograph (Freud, 1915). BPG therapy can be particularly useful in situations where very intense feelings undermine the possibility of ascribing meaning to the experience of the disease. In the contexts of MM and COVID-19, BPG therapy can help patients and caregivers find meaning in the significant changes in their lives related to the disease and medical treatments, allowing them to identify more adaptive strategies and more realistic relational modalities to deal with their situation. Thinking together within the group may help participants to give meaning to the transformations in their lifestyle brought about by the experience of the disease and the related feelings. The psychotherapy group therefore represents a setting where listening of the specific personal modalities through which despair and helplessness related to the catastrophic impact of the

diagnosis are expressed, allows to share, allowing the participant to regain their self-confidence as well as trust in others and hope in life (Ambrosiano, 2016).

## CONCLUSION

MM and COVID-19 have different etiologies but are similar in some important respects, including a clear relationship with their etiologic agents, symptomology, and target organ (respiratory system), and psychological impact. We propose applying what we have learned from MM—specifically, the impact on patients, caregivers, and the general population—to the new challenge of COVID-19. The occupational origin of the disease (predominant in MM but still relevant in COVID-19) suggests the need to develop a surveillance system that includes an individual anamnestic evaluation of occupational risk factors for COVID-19. An occupational surveillance system was recently proposed for monitoring and preventing SARS-CoV-2 transmission in workplaces and improving the effectiveness of the insurance system (Marinaccio et al., 2020a). It will also be important to implement a control system that gives adequate consideration to the occupational dimension of risk to correctly manage vaccination policies (Marinaccio et al., 2020b). The BPG therapy model of intervention developed for MM patients and their caregivers can be successfully adapted to COVID-19 patients and caregivers. Living in asbestos-contaminated sites and in areas most affected by the pandemic both have important impacts on different levels of personal experience including being (health and somatopsychic well-being), belonging (the sense of being part of a community), and becoming (one's expectations for the future) (Fauci et al., 2012; Granieri, 2015). Thus, implementation of an integrated multidimensional intervention by hospitals and other public health services will be useful for addressing the psychological distress and needs of patients and caregivers affected by COVID-19.

## AUTHOR CONTRIBUTIONS

AG conceived of the presented idea. AG, IF, and MB contributed to the interpretation of the data, drafting and critical revision of the manuscript, giving an important clinical, and intellectual contribution. AM, II, and DM contributed to the interpretation of the data and critical revision of the manuscript. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed to the article and approved the submitted version.

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# Assessment of Depression Severity During Coronavirus Disease 2019 Pandemic Among the Palestinian Population: A Growing Concern and an Immediate Consideration

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**Background:** Aggressive quarantine and lockdown measures were implemented as protective public health actions during the coronavirus disease 2019 (COVID-19) pandemic. Assessing the psychological effects associated with these measures is an important attempt to inform local policymakers in an early stage. Yet little is known about these effects, specifically depression, among the Palestinians. This study aimed to assess the prevalence and predictors of depression among the Palestinian community during this pandemic.

**Materials and methods:** A cross-sectional web-based survey throughout social media (Facebook and Instagram) was carried out using an anonymous online questionnaire. The validated and standardized depression, anxiety, and stress scale (DASS) was used to measure depression severity. A snowball technique recruiting the general public living in Palestine was conducted. Data were collected between 6 and 16 April 2020, which corresponded to the middle interval of strict massive lockdown in Palestine on 22 March to 5 May 2020. Multinomial logistic regression model was developed to predict depression severity.

**Results:** About 2,819 respondents filled out the questionnaire. Depression prevalence was (57.5%;  $n = 1,621$ ). Out of them, 66% had mild/moderate severity, and 34% had severe/extremely severe degree. Depression severity was negatively associated with age {mild/moderate degree [OR (95% CI) = 0.98 (0.97–0.99)] and severe/extremely severe [OR (95% CI) = 0.96 (0.94–0.97)]} degrees compared with normal degree. Males were significantly less likely to have higher depression than females {mild/moderate degree [OR (95% CI) = 0.69 (0.57–0.85)] and severe/extremely severe [OR (95% CI) = 0.52 (0.40–0.86)]} degree. However, those who reported having inadequate food supply and lesser monthly incomes were more likely to have a higher degree of depression as compared with normal degree. Single persons were significantly more likely to have mild/moderate depression than those in a relationship [OR (95% CI) = 1.31 (1.05–1.64)].

**Conclusions:** High depression prevalence (57.5%) among the Palestinian community during the COVID-19 pandemic is a growing public health concern. It is essential to provide psychological counseling and treatment during and after the pandemic for the

targeted people at high risk (young age/female gender) who were affected psychologically. Strategic long-term policy to address pandemic ramifications, including depression, by implementing comprehensive interventions taking into account socioeconomic disparities, vulnerability, and inequities, is crucial to emerge from this crisis in Palestine.

**Keywords:** COVID-19, depression, Palestine, quarantine, lockdown

## BACKGROUND

Quarantine was adopted as an obligatory means of separation and to restrict the movement of people who have potentially been exposed to a contagious disease and to limit disease spread (1). It has been used for centuries to contain infectious diseases such as cholera and the plague (2). Most recently, quarantine has been used in the coronavirus disease 2019 (COVID-19) pandemic (3).

Separation from loved ones and the loss of freedom during the quarantine are often unpleasant experiences (3), and they create dramatic psychological and emotional effects on some people, such as depression (2). Age, educational level, gender, marital status, living with other adults, having children, and other factors may play a role in psychological problem development such as depression (3). Anxiety and mood disorders are the most common mental health problems in the general population all over the world, and there are important connections between anxiety and depression and the occurrence of viral diseases (4). Therefore, the successful use of quarantine as a public health measure requires us to reduce and manage, as far as possible, the negative effects associated with it (3).

During the COVID-19 quarantine in Southwestern China, nearly 14.6% of study participants had depression, 8.3% had mild depression, 5.2% had moderate depression, and 1.1% had severe depression. The study also found that those who are single or very worried had significantly a higher level of depression than others. But those with “very good” self-perceived health and high income had lower levels of depression than others (4). Another multicenter survey involving 1,563 medical staff found the prevalence of depression to be 50.7% (5).

During the COVID-19 outbreak, Palestine had undergone massive quarantine for nearly 43 days (from 22 March to 5 May 2020). However, the psychological impact of this quarantine and its related lockdown measures among the Palestinian community is unknown. Aggressive quarantine and lockdown measures were implemented globally as precautionary and protective public health actions during the COVID-19 pandemic. Assessing the psychological effects associated with these implemented measures is an important research attempt to inform local policymakers on the evidence in an early stage. Yet no data are available regarding the level of depression among the general population in Palestine, and to the best of our knowledge, no study had evaluated this issue, specifically depression, among the Palestinian general public. This study seeks to assess prevalence and predictors of depression severity among the Palestinian community as the first important step for creating an early targeted intervention and helping people return to normal life.

## MATERIALS AND METHODS

### Study Population, Sample, and Setting

The target population comprised all people who are 18 years or older and currently living in the West Bank, Gaza Strip, and East Jerusalem. We adopted a cross-sectional survey design to find the prevalence of depression among the public and to identify possible risk factors during the pandemic of COVID-19 by using an anonymous online questionnaire. A snowball sampling strategy focused on recruiting the general public living in Palestine during the pandemic was conducted. The online survey was first disseminated on Facebook and Instagram to friends, and they were encouraged to pass it on to others.

### Procedure

As the Palestinian Government recommended the public to minimize face-to-face interaction and isolate themselves at their homes, potential respondents were electronically invited. All of them completed the questionnaires in Arabic through an online survey. Expedited ethics approval was obtained from the Institutional Review Board (IRB) at An-Najah National University (Faculty of Medicine and Health Sciences). Privacy was strictly protected during the procedure. The purposes of the study and information about it were posted on the first page of the questionnaire. All respondents provided online informed consent before starting the questionnaire. The IRB approved our request for a waiver of documentation of this method of obtaining consent. Data collection took place over 10 days (6 to 16 April 2020), which corresponds to almost the middle interval of the massive quarantine in Palestine (22 March to 5 May 2020).

### Survey Development

Previous surveys on the assessment of mental health during quarantine in outbreaks were reviewed (5). The authors included additional questions related to the COVID-19 outbreak in Palestine. The structured questionnaire consisted of questions that covered several areas: (1) informed consent, (2) demographic data, (3) knowledge and concerns about the quarantine, (4) precautionary measures against the COVID-19, and (5) depression, anxiety, and stress scale (DASS) form in Arabic. DASS is an instrument that included 42 self-report items designed to measure the three related negative emotional states of depression, anxiety, and tension/stress. A short version, the DASS21, is available with seven items per scale (6). DASS showed excellent Cronbach's alpha values of 0.81, 0.89, and 0.78 for the subscales of depression, anxiety, and stress, respectively (7).

An Arabic-language version of the DASS was used. The form was adapted from a published study over the psychometric

**Table 1 |** Depression severity original scores and the study re-adjusted scores.

Severity	Depression severity original scores
Normal	0–9
Mild	10–13
Moderate	14–20
Sever	21–27
Extremely sever	+28

**Scores in this study were re-adjusted as:**

Severity	Depression severity re-adjusted scores
Normal	0–9
Mild/moderate	10–20
Sever/extremely sever	+21

properties of an Arabic version of the DASS, in which the results supported the universality of depression, anxiety, and stress across cultures and thus provided initial support for the psychometric properties of the Arabic DASS (8).

A pilot study was performed on a small group of volunteers for feedback to identify ambiguities and difficult questions and to record the time needed to complete the online questionnaire, and therefore, very minor rewording was made to clarify some words and questions related to the COVID-19 pandemic and quarantine.

### Statistical Analysis

DASS contains three subscales, each composed of seven questions. The Depression subscale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. Subjects were asked to use 4-point severity/frequency scales to rate the extent to which they have experienced each state over the past week, as follows:

- 0 = Did not apply to me at all.
- 1 = Applied to me to some degree, or some of the time.
- 2 = Applied to me to a considerable degree or a good part of the time.
- 3 = Applied to me very much or most of the time.

Depression scores were calculated by summing the scores for the seven questions regarding depression in the DASS21 scale. The scores were between 0 and 21, and then they were multiplied by 2, so the final score for each participant was between 0 and 42. Scores and categories are shown in **Table 1** (6).

DASS scores may be presented in five categorical levels. However, in this study, and according to standardized cutoffs, we merged mild with moderate and severe with extremely severe cutoff scores for depression (**Table 1**) to facilitate the multivariate analysis, as some cells showed less than five cases in some categorical independent variables, and this is usually accepted (9).

Data were entered into the 27th version of IBM SPSS (IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp). In this study, 2,819 individuals completed and returned the questionnaire. Descriptive analysis, median, mean, and standard deviation for continuous variables, and frequencies/percentages for categorical independent variables were conducted. Independent *t*-test was used to test for

**Table 2 |** Bivariate analysis of socio-demographic characteristics with depression severity (*P*-value presented was Chi-square significance; *N* = 2,819).

Variables	<i>N</i> (%)	Depression severity			<i>P</i> -value
		Normal <i>n</i> = 1,198	Mild to moderate <i>n</i> = 1,071	Severe to extremely sever <i>n</i> = 550	
Age	2,819 (100)	Mean = 31.98 SD = 11.9	Mean = 28.3 SD = 10.4	Mean = 26.28 SD = 8.5	<0.001* (ANOVA- test)
<b>Sex</b>					
Male	768 (27.2)	389 (32.5)	258 (24.1)	121 (22)	<0.001*
Female	2,051 (72.8)	809 (67.5)	813 (75.9)	429 (78)	
<b>Social status</b>					
Single	1,449 (51.4)	513 (42.8)	594 (55.5)	342 (62.2)	<0.001*
Relationship	1,370 (48.6)	685 (57.2)	477 (44.5)	208 (37.8)	
<b>Residency</b>					
Village	1,380 (49)	625 (52.2)	517 (43.2)	56 (4.7)	0.006*
City	1,292 (45.8)	512 (47.8)	508 (47.4)	51 (4.8)	
Refugee camp	147 (5.2)	243 (44.2)	267 (48.5)	40 (7.3)	
<b>Geographic area</b>					
West Bank	2,354 (83.5)	1,035 (86.4)	884 (82.5)	435 (79.1)	<0.001*
Gaza Strip	270 (9.6)	85 (7.1)	106 (9.9)	79 (14.4)	
Jerusalem	195 (6.9)	78 (6.5)	81 (7.6)	36 (6.5)	
<b>Educational level</b>					
Secondary or less	326 (11.6)	152 (12.7)	117 (10.9)	57 (10.4)	0.003*
College	2,211 (78.4)	900 (75.1)	870 (81.2)	441 (80.2)	
Master or doctorate	282 (10)	146 (12.2)	84 (7.8)	52 (9.5)	
<b>Health care worker</b>					
Yes	332 (11.8)	138 (11.5)	125 (11.7)	69 (12.5)	0.818
No	2,487 (88.2)	1,060 (88.5)	946 (88.3)	481 (87.5)	
<b>Monthly income</b>					
<2,000	568 (20.1)	198 (16.5)	231 (21.6)	139 (25.3)	<0.001*
2,000–5,000	1552 (55.1)	681 (56.8)	598 (55.8)	273 (49.6)	
>5,000	699 (24.8)	319 (26.6)	242 (22.6)	138(25.1)	
<b>Smoking/Shisha</b>					
Yes	693 (24.6)	289 (24.1)	262 (24.5)	142 (25.8)	0.742
No	2,126 (75.4)	909 (75.9)	809 (75.5)	408 (74.2)	
<b>High risk group in home</b>					
Yes	1,283 (45.5)	513 (42.8)	484 (45.2)	286 (52)	0.002*
No	1,536 (54.5)	685 (57.2)	587 (54.8)	264 (48)	

\*It means that the *p*-value is statistically significant.

significance among continuous variables and the chi-square test for categorical variables. Variables that showed significance in the bivariate analysis (*P*-value <0.05) were included in a multinomial logistic regression model to predict the factors associated with each depression severity degree and presented as odds ratio and 95%CI.

## RESULTS

### Characteristics of the Study Population

In this study, 2,819 individuals completed and returned the questionnaire (**Table 2**). The mean age of respondents was 29.47

years with SD of 10.97. We divided the population into three groups according to age: young (18–35), middle (36–53), and elderly (>53) age groups. Nearly 73.9% were in young age, and only 4% of participants were elderly. More than two thirds (72.6%) of respondents were female. Almost half of them (51.4%) were single. The majority of respondents live in the West Bank (83.5%), and only 9.6% live in Gaza. Around 55.1% ( $n = 1,552$ ) of participants had an income of 2,000–5,000 New Israeli Shekels (555–1,388 USD) per month.

Most of the participants (78.4%) were currently studying in college or have graduated recently. On the other hand, 10% of them are studying a master or doctorate degree. Almost one quarter (24.6%) were smokers, and only 11.8% were health-care workers. About 45.5% reported that they had a high-risk individual living with them currently.

Results showed that 1,144 (40.6%), 1,261 (44.7%), and 1,283 (45.5%) of respondents had low levels of stay-at-home commitment, commitment to inside home precautions, and understanding of quarantine, respectively.

### Quarantine Characteristics of the Population

As shown in **Table 3**, 98% of respondents believed that quarantine is important, and 2,173 (77.1%) expressed that they are afraid of getting the COVID-19 or transmitting it to others. Only 14.9% of respondents had jobs that required them to go outdoors, and only 85 (3%) had at least one of their relatives with confirmed COVID-19. The two most common sources of information about quarantine and precautions were social media and television or radio (59.5 and 18.6%, respectively). Nearly 80.2% admitted that they are properly informed about the quarantine. In addition, 29.3% reported that they had inadequate food supply to withstand the quarantine period.

Quarantine duration ranged from <2 weeks at 6.6% to more than 4 weeks at 35.4%. Nearly 38.2% used to spend between 6 and 10 h outside the home before quarantine, 20.7% spent <2 h, and only 13.6% spent more than 10 h (see **Table 3** for more details).

### Prevalence of Depression in Bivariate Analysis

The prevalence of depression was 57.5% ( $n = 1,621$ ; 38% with mild/moderate depression and 19.5% with severe/extremely severe).

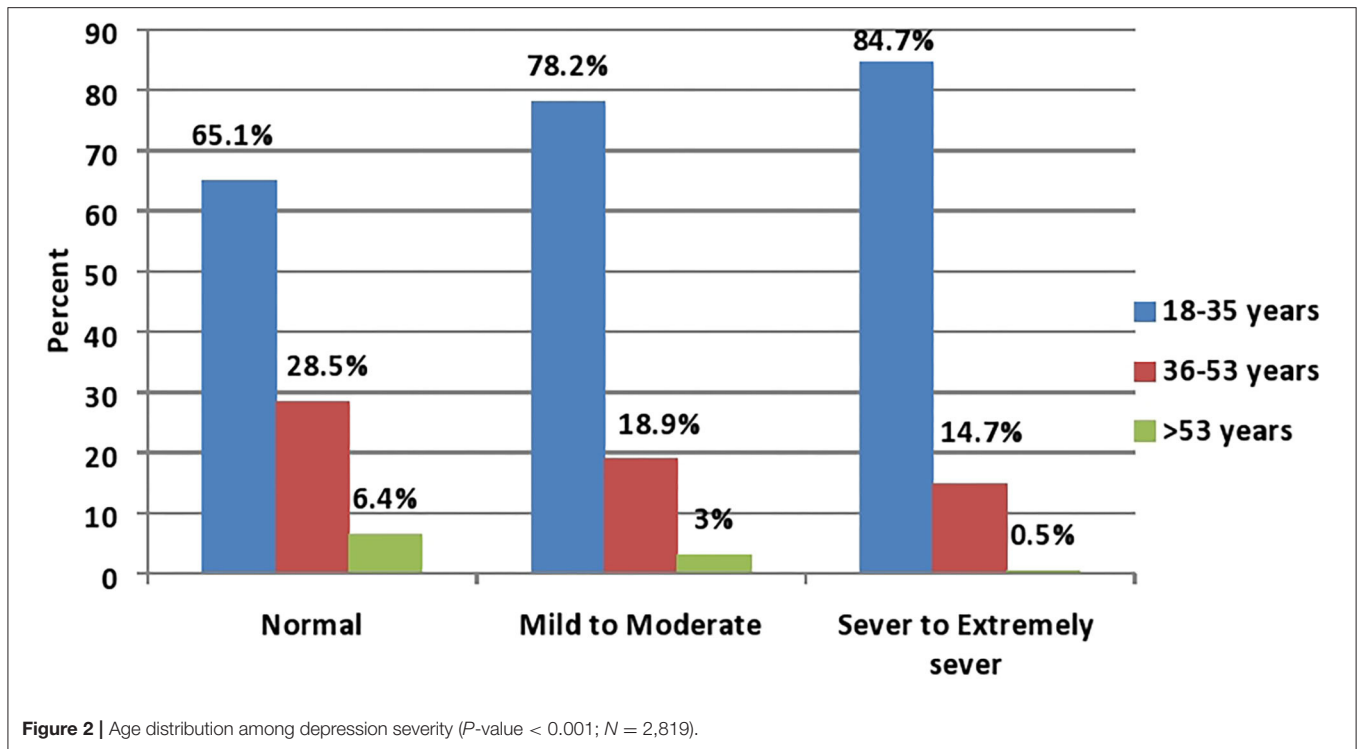
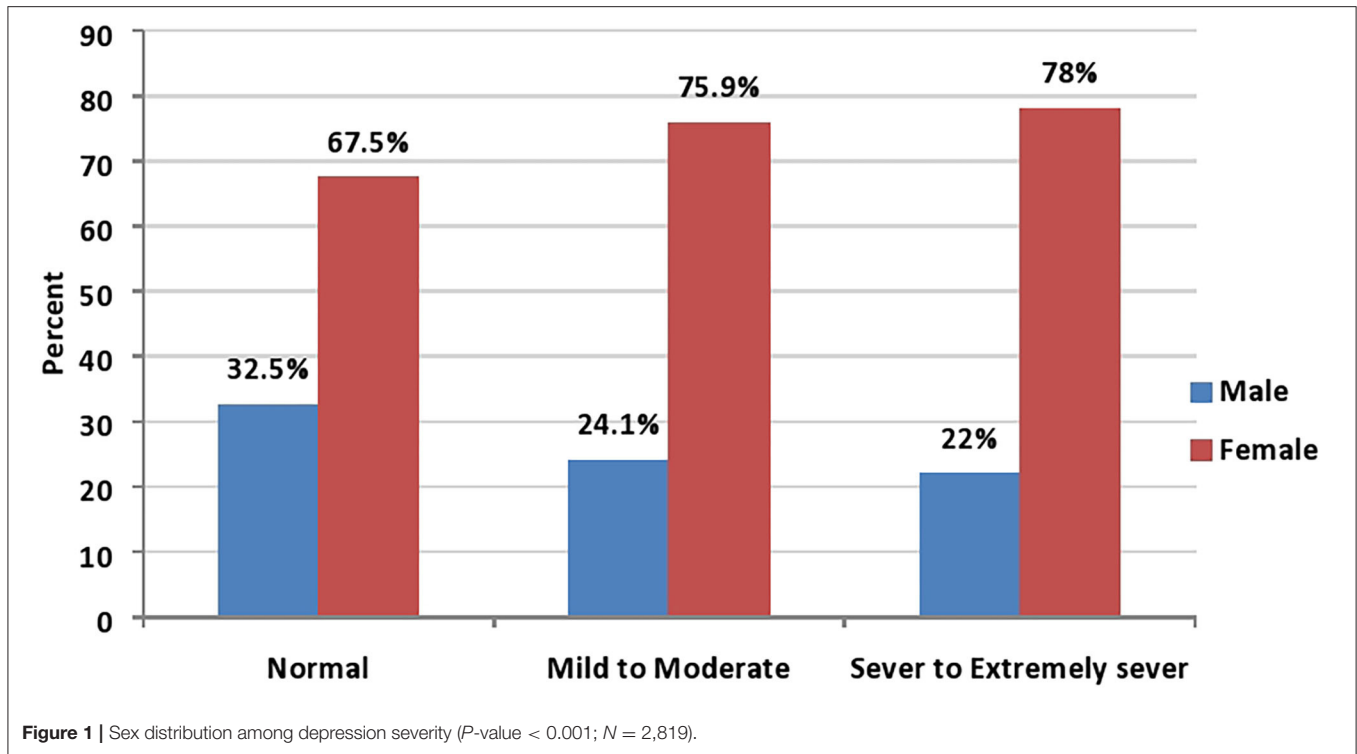
In the bivariate analysis, statistically significant associations were found between depression severity and each of age, sex, social status, residency, geographic area, educational level, monthly income, smoking, and the presence of a high-risk individual ( $P$ -value < 0.05; see **Table 2**). Females represented the majority in all depression degrees as compared with males with 67.5, 75.9, and 78% in normal, mild/moderate, and severe/extremely severe degrees, respectively (**Figure 1**;  $P$ -value < 0.001). Similarly, the young age group (18–35 years) represented the majority in all depression degrees with 65.1, 78.2, and 84.7% in normal, mild/moderate, and severe/extremely severe degrees, respectively (**Figure 2**;  $P$ -value < 0.001).

**Table 3 |** Bivariate analysis of quarantine characteristics with depression severity ( $P$ -value presented was Chi-square significance;  $N=2819$ ).

Variables	N (%)	Depression severity			P-value
		Normal $n = 1,198$	Mild to moderate $n = 1071$	Severe to extremely severe $n = 550$	
<b>Do you think quarantine is important?</b>					
Yes	2,763 (98)	1,175 (98.1)	1,055 (98.5)	533 (96.9)	0.090
No	56 (2)	23 (1.9)	16 (1.5)	17 (3.1)	
<b>Type of quarantine</b>					
Obligated to stay at home	2,398 (85.1)	1,006 (84)	924 (86.3)	468 (85.1)	0.308
I have to work outside home	421 (14.9)	192 (16)	147 (13.7)	82 (14.9)	
<b>Any of relatives or acquainted infected?</b>					
Yes	85 (3)	23 (1.9)	38 (3.5)	24 (4.4)	0.009*
No	2,734 (97)	1,175 (98.1)	1,033 (96.5)	526 (95.6)	
<b>Afraid of getting COVID-19 or transmit it?</b>					
Yes	2,173 (77.1)	883 (73.7)	865 (80.8)	425 (77.3)	<0.001*
No	646 (22.9)	315 (26.3)	206 (19.2)	125 (22.7)	
<b>Properly informed about quarantine</b>					
Yes	2,262 (80.2)	1,002 (83.6)	858 (80.1)	402 (73.1)	<0.001*
No	557 (19.8)	196 (16.4)	213 (19.9)	148 (26.9)	
<b>Source of information</b>					
Television or radio	525 (18.6)	24 (20.6)	186 (17.4)	92 (16.7)	0.003*
Official government agencies	359 (12.7)	177 (14.8)	127 (11.9)	55 (10)	
A health care worker	159 (5.6)	74 (6.2)	55 (5.1)	30 (5.5)	
Social media	1,676 (59.5)	668 (55.8)	659 (61.5)	349 (63.5)	
Conversation with other people	100 (3.6)	32 (2.7)	44 (4.1)	24 (4.4)	
<b>Enough food supply to withstand quarantine period?</b>					
Yes	1,994 (70.7)	891 (74.4)	782 (71.7)	341 (62)	<0.001*
No	825 (29.3)	307 (25.6)	309 (28.9)	209 (38)	
<b>Quarantine duration</b>					
1–2 weeks	187 (6.6)	80 (6.7)	74 (6.9)	33 (6)	0.280
2–3 weeks	847 (30.1)	390 (32.6)	301 (28.1)	156 (28.4)	
3–4 weeks	786 (27.9)	327 (27.3)	300 (28)	159 (28.9)	
>4 weeks	999 (35.4)	401 (33.5)	396 (37)	202 (36.7)	
<b>Average hours out home before quarantine</b>					
<2h	584 (20.7)	251 (21)	209 (19.5)	124 (22.5)	0.020*
2–6h	776 (27.5)	314 (26.2)	335 (31.3)	127 (23.1)	
6–10h	1,075 (38.2)	470 (39.2)	391 (36.5)	214 (38.9)	
>10h	384 (13.6)	163 (13.6)	136 (12.7)	85 (15.5)	
<b>Stay at home commitment</b>					
Low level	1,144 (40.6)	501 (41.8)	424 (39.6)	219 (39.8)	0.514
High level	1,675 (59.4)	697 (58.2)	647 (60.4)	331 (60.2)	
<b>Commitment to inside home precautions</b>					
Low level	1,261 (44.7)	503 (42)	506 (47.2)	252 (45.8)	0.036*
High level	1,558 (55.3)	695 (58)	565 (52.8)	298 (54.2)	
<b>Understanding of quarantine</b>					
Low level	1,283 (45.5)	534 (44.6)	487 (45.5)	262 (47.6)	0.490
High level	1,536 (54.5)	664 (55.4)	584 (54.5)	288 (52.4)	
Self-rating of quarantine commitment	2,819 (100)	Mean = 8.43 SD = 1.9	Mean = 8.55 SD = 1.7	Mean = 8.54 SD = 1.9	0.230

\*It means that the p-value is statistically significant.





Nearly 48.5% of the total refugee camps residents had mild/moderate depression, and 7.3% had severe/extremely severe degree of depression; and this represents the highest percentage distribution as compared with city and village residents among depression severity degrees.

West Bank residents represented the majority among all depression degrees as compared with Gaza and Jerusalem (86.4% of the normal, 82.5% of the mild/moderate, and 79.1% of the severe/extremely severe degrees). Statistically significant associations were found between depression severity and having

enough food supply to withstand quarantine, average hours out of the home before quarantine, and commitment to inside home precautions ( $P$ -value < 0.05; see **Table 3**).

## Multinomial Regression Analysis of Depression Severity Predictors

Multinomial regression model for the variables associated with depression severity is shown in **Table 4**. As shown, depression severity was negatively associated with age {mild/moderate degree [OR (95% CI) = 0.98 (0.97–0.99)]} and {severe/extremely severe [OR (95% CI) = 0.96 (0.94–0.97)]} as compared with normal degree. Males were significantly less likely to have a higher depression degree as compared with females {mild/moderate degree [OR (95%CI) = 0.69 (0.57–0.85)]} and {severe/extremely severe [OR (95%CI) = 0.52 (0.40–0.86)]}. However, those who reported inadequate food supply were associated with a higher degree of depression compared with normal degree. Single persons were significantly more likely to have mild/moderate depression compared with those in a relationship [OR (95% CI) = 1.31 (1.05–1.64)].

Those with a monthly income of <2,000 New Israeli Shekels (<555 USD) were significantly more likely to have mild/moderate depression than those with normal degree and higher monthly incomes [OR (95% CI) = 1.48 (1.11–1.97)]. Those who do not have a high-risk individual living with them were significantly less likely to have severe/extremely severe depression than normal degree [OR (95% CI) = 0.69 (0.56–0.85)]. Moreover, those who reported that none of their relatives were infected with the COVID-19 and those who are not afraid of being infected were inversely related to a higher degree of depression severity (see **Table 4**).

Being not properly informed about quarantine was a significant positive predictor of severe/extremely severe depression compared with normal degree [OR (95% CI) = 1.56 (1.20–2.02)]. On the other hand, those who usually spend lesser hours (2–6 h) out the home before quarantine were significantly less likely to have severe/extremely severe depression compared with more hours (>10 h) and normal degree [OR (95% CI) = 0.59 (0.41–0.85)]. However, those who reported a low level of commitment to inside home precautions were more likely to have mild/moderate depression [OR (95% CI) = 1.20 (1.01–1.43)].

It should be noted that residency, geographic area, educational level, and source of information did not remain significant after adjusting for other variables in the multinomial regression model.

## DISCUSSION

In this study, the prevalence of depression among the Palestinian community during the COVID-19 pandemic was found to be 57.5% (38% with mild/moderate depression and 19.5% with severe/extremely severe). A cross-sectional general population study of 916 Palestinian adults in 2007 reported the 1-month prevalence of major depressive episodes was 10.6% (10). Our study reported a five-fold increase in the prevalence of depression during the COVID-19 in Palestine. This finding represents a

high degree of depression at the general population level in Palestine. Moreover, a recent study in Italy reported a prevalence of 17.3% of depression among the Italian general population during the COVID-19 pandemic (11). In Spain (12), a similar study evaluated the prevalence of depression among the Spanish general population and found that depression was around 19%. Whereas in the UK, the prevalence was 22.12% during the COVID-19 pandemic among the general population (13).

A possible explanation for our finding of a high level of depression could be that in Italy and Spain the prevalence was evaluated in the early stages of the COVID-19 pandemic, while in this study, it has been evaluated at the late stage of the pandemic. Moreover, Palestine is classified as a low- to middle-income country (14) and has a low socioeconomic status with a special geopolitical situation, which could add to the negative mental health effects during the COVID-19 in Palestine. Another study in China (5) reported a prevalence of depression during the COVID-19 for inpatient health questionnaire to be around 50.7%, which is near our findings. This raises an alarming sign in Palestine, as the participants were not COVID-19 patients, and the result is higher than that reported among patients in other countries. We found no study from the Arab world that evaluated depression during the COVID-19 for comparison, and this study could be a starting point for other future studies to cite from the Arab world.

Another important finding in this study was that females were associated with mild/moderate degree and severe/extremely severe degree of depression as compared with males. This is consistent with two studies during the COVID-19 lockdown measures that showed that females were more vulnerable to negative emotional outcomes such as depression (11, 15). The cultural background and the fact that home responsibility relied mainly on females in Palestine could add to more emotional and depressive effects among females during the lockdown measures. Moreover, females are a vulnerable group in the Palestinian community. Furthermore, females are the main component of the young age adult group in this study, and this might partially contribute to the high prevalence of depression among this gender-age group. Interestingly enough, age showed an inverse relationship with depression severity during the lockdown and massive quarantine in Palestine during the COVID-19. Our results are in accordance with those of similar studies in Italy and Spain conducted during the same pandemic (11, 12). It is noteworthy that young adults in the Palestinian community represent university students mainly, and as a result of lockdown, online educational activities were implemented to continue the ongoing academic semester. This group of young adults had to deal with the dramatic changes in requirements to pass the academic semester. At the same time, this group of the young population includes newly graduated adults who are still unemployed or newly employed, so they tend to have less sustained monthly income than older adults. This finding should be taken seriously by decision makers since the young age group is the main productive group in Palestine and worldwide. Therefore, losing productivity might have impacts not only at the personal level but also at the national socioeconomic level of the country.

**Table 4** | Multinomial regression model for the variables associated with depression severity<sup>#</sup> (N = 2,819).

Variable	Mild to moderate				Severe to extremely severe			
	B	SE	OR (95%CI)	P-value	B	SE	OR (95%CI)	P-value
Age (continuous)	-0.02	0.005	0.98 (0.97-0.99)	0.001	-0.04	0.008	0.96 (0.94-0.97)	<0.001
<b>Sex</b>								
Male	-0.37	0.104	0.69 (0.57-0.85)	<0.001	-0.65	0.134	0.52 (0.40-0.68)	<0.001
Female*	-	-	-	-	-	-	-	-
<b>Social status</b>								
Single	0.27	0.114	1.31 (1.05-1.64)	0.017	0.25	0.143	1.29 (0.97-1.71)	0.076
In relationship*	-	-	-	-	-	-	-	-
<b>Residency</b>								
Village	0.002	0.217	1.00 (0.66-1.53)	0.993	-0.34	0.243	0.71 (0.44-1.15)	0.162
City	0.19	0.213	1.21 (0.80-1.84)	0.372	-0.11	0.237	0.89 (0.56-1.42)	0.631
Refugee camp*	-	-	-	-	-	-	-	-
<b>Geographic area</b>								
West Bank	-0.15	0.174	0.86 (0.61-1.21)	0.394	0.11	0.224	1.11 (0.72-1.73)	0.631
Gaza Strip	-0.18	0.234	0.83 (0.53-1.32)	0.432	0.35	0.283	1.42 (0.82-2.48)	0.212
Jerusalem*	-	-	-	-	-	-	-	-
<b>Educational level</b>								
Secondary or less	0.07	0.198	1.07 (0.73-1.57)	0.739	-0.35	0.246	0.71 (0.44-1.15)	0.161
College	0.19	0.155	1.20 (0.89-1.63)	0.231	-0.23	0.189	0.80 (0.55-1.16)	0.231
Master or doctorate*	-	-	-	-	-	-	-	-
<b>Monthly income</b>								
<2,000	0.39	0.145	1.48 (1.11-1.97)	0.007	0.17	0.173	1.18 (0.84-1.66)	0.335
2,000-5,000	0.18	0.109	1.20 (0.97-1.48)	0.069	-0.12	0.135	0.89 (0.69-1.16)	0.394
>5,000*	-	-	-	-	-	-	-	-
<b>High risk group in home</b>								
No	-0.10	0.088	0.91 (0.76-1.08)	0.271	-0.38	0.109	0.69 (0.56-0.85)	0.001
Yes*	-	-	-	-	-	-	-	-
<b>Any of relatives or acquainted infected?</b>								
No	-0.66	0.275	0.52 (0.30-0.89)	0.016	-0.83	0.310	0.44 (0.24-0.80)	0.007
Yes*	-	-	-	-	-	-	-	-
<b>Afraid of getting COVID-19 or transmit it?</b>								
No	-0.44	0.106	0.65 (0.53-0.80)	<0.001	-0.25	0.129	0.78 (0.61-1.01)	0.057
Yes*	-	-	-	-	-	-	-	-
<b>Properly informed about quarantine</b>								
No	0.15	0.115	1.17 (0.93-1.46)	0.187	0.44	0.133	1.56 (1.20-2.02)	0.001
Yes*	-	-	-	-	-	-	-	-
<b>Source of information</b>								
Television or radio	-0.40	0.261	0.67 (0.40-1.12)	0.127	-0.23	0.312	0.80 (0.43-1.47)	0.470
Official government agencies	-0.53	0.269	0.59 (0.35-1.00)	0.050	-0.56	0.327	0.57 (0.30-1.08)	0.085
A health care worker	-0.58	0.301	0.56 (0.31-1.01)	0.055	-0.52	0.363	0.59 (0.29-1.21)	0.151
Social media	-0.28	0.246	0.76 (0.47-1.23)	0.262	-0.15	0.291	0.86 (0.49-1.52)	0.602
Conversation with other people*	-	-	-	-	-	-	-	-
<b>Enough food supply to withstand quarantine period?</b>								
No	0.20	0.103	1.22 (1.00-1.49)	0.056	0.62	0.122	1.86 (1.47-2.37)	<0.001
Yes*	-	-	-	-	-	-	-	-
<b>Average hours out home before quarantine</b>								
<2 h	-0.16	0.159	0.85 (0.63-1.17)	0.321	-0.27	0.188	0.77 (0.53-1.11)	0.156
2-6 h	0.04	0.150	1.04 (0.78-1.40)	0.779	-0.53	0.186	0.59 (0.41-0.85)	0.004
6-10 h	-0.10	0.142	0.91 (0.69-1.20)	0.481	-0.28	0.169	0.76 (0.55-1.06)	0.103
>10 h*	-	-	-	-	-	-	-	-
<b>Commitment inside home precautions</b>								
Low level	0.18	0.089	1.20 (1.01-1.43)	0.040	0.09	0.110	1.09 (0.88-1.35)	0.44
High level*	-	-	-	-	-	-	-	-

<sup>#</sup>Reference category: Normal; \*Reference category. OR, Odds ratio; CI, Confidence interval.

Likelihood Ratio Test of the final model fitting significance was <0.001. Pearson chi-square test for model goodness-of-fit was significance 0.336.

Those who do not have a high-risk individual inside the home were less likely to have severe/extremely severe depression. This result was also found in the UK (13), which demonstrated that people who have a relative or family member with a preexisting medical condition were more likely to have depressive symptoms.

Monthly income was inversely related to the degree of depression. This is consistent with a study conducted in Southwestern China (4) that reported that a high average household income group had a significantly lower level of depression than a low average household income group due to the economic impact of the COVID-19 and failure to cope with financial problems. In another study in the UK (13), a significant association was also found between loss of income and depression. However, those who reported having inadequate food supply were more likely to have a higher degree of depression compared with normal degree. This may be because those people who reported a shortage of food supply were potentially from low-income group or they lost their jobs as a consequence of lockdown measures. Thus, they had been exposed to a difficult situation without financial support.

Single persons were more likely to have mild/moderate depression than those in a relationship. These findings are congruent with other results that come from China (4). Single persons could be away from their beloved ones, and this might contribute to more depressed emotions among the general population in Palestine. Moreover, those who reported that none of their relatives were infected with the COVID-19 and those who were not afraid of being infected were less likely to have a higher degree of depression severity. All these factors could stimulate another psychological burden on people, which may explain why they showed a significant association with the higher degree of depression. Furthermore, those who usually spend lesser hours (2–6 h) out the home before quarantine were less likely to have severe/extremely severe depression than those who spend more hours (>10 h) and normal degree. This could be because those who used to go outside the home more frequently tend to find more difficulty engaging in inside home activities than persons who usually spend less time outside home.

It is worth mentioning that in our study educational level had no impact on depression severity. This contradicts other similar studies that found a significant association between educational level and depression degree (4, 11, 15). In our study, this could be because those who have a secondary level of education or less were not engaged in online learning, and they are dependent on their parents in the Palestinian community. However, those with a college degree and higher might have higher socioeconomic status and a stable monthly income.

It should be noted that the depression severity may be also attributed to the unclear future and whether or not the adopted governmental plan will overcome the build-up of troubles and consequences of the extreme lockdown. However, we did not investigate these factors in this study, and therefore, further future studies on this perspective might be needed.

Our study could be limited by the sampling technique, and therefore, selection bias might be encountered. For example, it was noticed that 72.8% of the sample were female which might overestimate the depression severity and therefore, our depression rates should be interpreted with caution.

Furthermore, due to social distancing during quarantine, we disseminated the survey on social media, and this might in part exclude people who did not have access to the internet and social media. On the other side, this was the only possible procedure during the lockdown measures, and it was useful in collecting the required information as fast and as safely as possible. This study was a cross-sectional web-based survey, and therefore, recall and/or systematic biases might have been occurred where overestimation or underestimation of some measures might have been occurred due to self-reporting. It should be noted however that this study has several strengths, including a large sample size and the sampling timeframe that corresponded to the peak surge of the COVID-19 cases in Palestine, which had 613 cases and 5 death when this paper was being written (16). Taking into account the worldwide nature of the risk in this pandemic, we strongly believe that these data could provide important and useful information to be generalized to other countries and to future pandemics.

## CONCLUSIONS

High rates of depression and various predictors of its severity among the Palestinian community during lockdown periods of the COVID-19 pandemic were reported. The high prevalence of depression (57.5%) forces the authorities and decision makers to immediately intervene to address the effects of this concerning rise among Palestinians along with the public health measures taking place. Strategic long-term policy to address the pandemic ramifications, including depression, by implementing comprehensive interventions taking into account the socioeconomic disparities, vulnerability, and inequities are crucial to emerge from this crisis in Palestine mainly among the young age group and female gender, who showed more vulnerability to depression.

We strongly believe that this study could help in generating socioeconomic and health initiatives to prevent and manage the pandemic's depression severity. It is crucial for communities to move forward and emerge from the crisis impacts. Furthermore, it is essential to provide psychological counseling and treatment during and after pandemic periods for these groups in Palestine. A post-pandemic assessment of depression among the Palestinian community is recommended to highlight any improvement or deterioration.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary materials, further inquiries can be directed to the corresponding author/s.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by IRB of An-Najah National University. All respondents provided online informed consent before starting the questionnaire. The IRB approved our request for a waiver of documentation of this method of obtaining consent.



## AUTHOR CONTRIBUTIONS

HA, TA, NY, and MH-Y designed study protocol and drafted the manuscript. HA coordinated the study protocol and conducted the statistical analysis. TA, NY, and MH-Y collected the data. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Does Self-Efficacy and Emotional Control Protect Hospital Staff From COVID-19 Anxiety and PTSD Symptoms? Psychological Functioning of Hospital Staff After the Announcement of COVID-19 Coronavirus Pandemic

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**Objectives:** The aim of this study was to assess coronavirus disease 2019 (COVID-19) anxiety and posttraumatic stress disorder (PTSD) symptoms in the hospital staff, as well as to identify protective factors of COVID-19 anxiety once the coronavirus pandemic was announced in Poland.

**Methods:** 90 healthcare workers from the hospital in Poland completed validated self-report questionnaires assessing self-efficacy, emotional control, and PTSD symptoms; a questionnaire assessing COVID-19 anxiety; and a socio-demographic questionnaire. A multiple linear regression was conducted to assess the effects of gender, being directly vs indirectly exposed to patients, and general self-efficacy on COVID-19 anxiety.

**Results:** The analysis showed that female ( $\beta = -0.271$ ,  $p < 0.01$ ) healthcare professionals indirectly exposed to patients ( $\beta = -0.336$ ,  $p < 0.01$ ) and those who reported lower levels of general self-efficacy ( $\beta = -0.295$ ,  $p < 0.01$ ) have a stronger tendency to experience COVID-19 anxiety [ $R^2 = 0.301$ ,  $F(3,89) = 12.34$ ,  $p < 0.01$ ].

**Conclusion:** The findings show the importance of self-efficacy for dealing with COVID-19 anxiety. The internal coping strategies should be introduced to healthcare workers.

**Keywords:** COVID-19, healthcare workers, disaster, fears, protective factors

## INTRODUCTION

Coronavirus disease 2019 (COVID-19) is thought to be a highly infectious disease. It is primarily transmitted by respiratory droplets and has a similar incubation time and generation time as SARS coronavirus (SARS-CoV) (Wilder-Smith and Freedman, 2020). The first case of COVID-19 had been reported in Wuhan City, China, on 9 January 2020 (Lu et al., 2020). Despite Wuhan City

being locked down within 2 weeks after COVID-19 had been reported, the novel virus has soon reached other provinces in China and neighboring countries. By 11 March 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic. At the time we started writing this article (13 April 2020), there were over 1.4 million confirmed cases of COVID-19 and 116,052 deaths globally; at the time we finished it (12 June 2020), there are 7,616,598 confirmed cases of COVID-19 and 424,227 deaths globally (Khasawneh, 2020; Medonet, 2020; Worldometers, 2020). 215 countries are affected by the novel coronavirus (Worldometers, 2020), including Poland, where the first case of COVID-19 had been reported on 4 March 2020, and the COVID-19 pandemic had been announced on 20 March 2020.

It is worth bearing in mind that since the Ebola virus pandemic back in 1976, COVID-19 pandemic has been the one and only pandemic outbreak from among 25 recognized EVD pandemics, which “spread all over the world” and fulfilled the criteria of a “pandemic” (Espinola et al., 2016; Rabelo et al., 2016; Shultz et al., 2016). Widespread outbreak of COVID-19 has frightened and alerted the whole world. This might be partly due to media, which has been constantly updating the global population with the news on COVID-19 outbreak. Fear behaviors in a situation of a disaster spread rapidly and contagiously (Espinola et al., 2016; Shultz et al., 2016), which has resulted in a global panic (Vellingiri et al., 2020). In Poland, the “pandemic fear” had started before the pandemic was announced. For example, “panic buying” (Sim et al., 2020) had started before the lock-down on 11 March 2020.

COVID-19 affects both the physical and mental health of the affected population (North et al., 2004; Khan et al., 2020; Lai et al., 2020; Super et al., 2020). During a disaster, mental disorders are often diagnosed in an affected population, such as adjustment disorders, depression, posttraumatic stress disorder (PTSD), anxiety disorders, non-specific somatic symptoms, and substance abuse (North, 2002; North et al., 2004; Liu et al., 2006; Tsai et al., 2007; Frankenberg et al., 2008; Hollifield et al., 2008; Wu et al., 2009; Math et al., 2015; Bidzan-Bluma et al., 2020; Lai et al., 2020; Khasawneh, 2020; Rajkumar, 2020; Super et al., 2020).

Researchers have assigned PTSD as the signature diagnosis among post-disaster mental morbidity (North, 2003; Math et al., 2015; Ogińska-Bulik and Kraska, 2017; Moghadam et al., 2020). The main PTSD symptoms are intrusion (reliving the traumatic event over and over again in dreams or memories), avoidance (of feelings, conversations, stimuli, or actions related to the event experienced), and agitation (trouble with focusing, but also falling asleep, general irritability, strong emotional reactions in response to sudden stimuli, constant sense of threat) (World Health Organization [WHO], 1992; Juczyński and Oginiska-Bulik, 2009; Juczyński, 2012; Rybojad and Aftyka, 2018). According to DSM-5 (2013), diagnosis of PTSD includes experiencing repeated or extreme exposure to aversive details of the traumatic events, occurring usually during performance of professional duties. In the case of disasters, this mainly refers to the emergency services (police, military, fire fighters, paramedics) (James, 2011a,b; Ogińska-Bulik, 2013, 2016; Ogińska-Bulik and Juczyński, 2016; Rybojad and Aftyka, 2018). In relation to COVID-19, this applies primarily to the medical staff providing

direct help to the infected patients and those under the threat of developing the disease. However, the incidence of PTSD in these groups is highly diversified and depends on factors such as the scope of exposure, social support, and training (James, 2011a,b; Ogińska-Bulik, 2013; Ogińska-Bulik and Juczyński, 2016). In particular, demographic characteristics such as age and gender are associated with different rates of PTSD, with younger people and women more likely to develop this stress disorder. Interpersonal and psychological characteristics of the individual, such as social support and self-esteem, have also been implicated in the onset and course of PTSD (Adams and Boscarino, 2006).

The medical personnel, including paramedics, physicians, nurses, obstetricians, nursing aids, psychologists, but also medical analysts, radiology professionals, and cleaning, transport, and technical staff, are all involved in a particular way in preventing the consequences of COVID-19 pandemic and performing crisis interventions. Healthcare workers should be regarded as a highly exposed group with a higher risk of psychiatric symptoms during the COVID-19 pandemic. The risk factors among healthcare workers include female gender and being a frontline worker among others (Vindegaard and Benros, 2020).

Among Chinese healthcare workers exposed to COVID-19 (from clinics or wards for patients with COVID-19 in multiple regions of China), women, nurses, individuals living in Wuhan, and frontline healthcare workers have been shown to have a high risk of developing unfavorable mental health outcomes. They reported experiencing symptoms of depression, anxiety, insomnia, and distress, especially female nurses (Lai et al., 2020).

Personal and social resources are constituting means of efficient coping with a threat. Studies have confirmed a positive meaning of the possibility to express emotions when faced with a disaster. Personal resources of an individual play a crucial role in emotional expression. These include the sense of personal control, self-efficacy, resourcefulness, sense of humor, optimism, valuation, and coping with distressing events (Adams and Boscarino, 2006; Doliński, 2006; Ranieri et al., 2020). Medical profession representatives are expected to have psychological resilience, whose significant aspect is experiencing emotions and expressing them in a certain way. Experiencing emotions is usually accompanied by somatic changes, mimic and pantomimic expressions, and specific behavior (Dąbrowska-Chołostakow and Kocbach, 2018). Emotions are related to self-control, which is defined as demonstrating a behavior consistent with the norms accepted by an individual or with social norms. Self-control involves reactions initiated by a subject, by means of which he achieves congruence among his own emotional states, thought and affective feelings, and the accepted internal norms (internalized rules of functioning) or the external ones (socially approved rules) (Wagner and Heatherton, 2013). It is emphasized in the literature that suppressing emotions is an unfavorable phenomenon, because it may lead to intensification of the experienced emotions or their lingering in the form of emotional tension (Doliński, 2006).

Self-efficacy allows to assess the situations accurately and seek efficient ways of coping with the encountered difficulties and obstacles (Juczyński, 2000, 2012). People with high self-efficacy can maintain relatively stable emotions even under pressure

(Bihlmaier and Schlarb, 2016). Self-efficacy also increases concentration and self-control (Przepiórka et al., 2019; Xiao et al., 2020). Low sense of self-efficacy is related to anxiety and sense of helplessness, while high sense of self-efficacy is related to the higher level of positive emotions (these persons assess distressing stimuli more often as a challenge than a threat), which favors taking up challenges, defining aims, and achieving successes in fulfilling them (Maddux and Lewis, 1995; Juczyński, 2012; Schwarzer, 2015).

Currently, there are no studies conducted on the psychological resources, including emotional control and self-efficacy, of healthcare workers during the COVID-19 pandemic. At the time of the COVID-19 pandemic, the workplace environment is not supportive in Polish hospitals because Polish healthcare centers suffer from acute lack of the necessary protective measures, including protective masks, disposable gloves, protective coats and coveralls, and disinfecting liquids. This makes healthcare workers particularly vulnerable to developing unfavorable mental health outcomes, including PTSD. Based on the previous studies, it seems that the sense of self-efficacy and emotional control (of anger, anxiety, depression) may be related to the functioning of the hospital staff, including the intensity of PTSD, after the COVID-19 pandemic was announced.

The aim of this study was to assess the psychological resources, including coping self-efficacy and emotional control (of anger, anxiety, depression) of hospital staff with reference to the coronavirus anxiety and PTSD symptoms after the coronavirus pandemic was announced.

This is the first study to investigate the psychological resources of healthcare workers during the COVID-19 pandemic, and the first study to assess psychological outcomes of the COVID-19 pandemic on healthcare workers in Europe.

## MATERIALS AND METHODS

### Study Group

The study group consisted of 90 healthcare workers from a district hospital in Kościerzyna, Pomeranian region, Poland. The staff included paramedics, physicians, obstetricians, nursing aids, psychologists, medical analysts, radiology specialists, cleaning, transport, and technical crews. Descriptive characteristics of the study participants are described in **Table 1**.

### Research Procedure

The study was conducted in the hospital on 22 March 2020—2 days after the coronavirus pandemic had been announced in Poland. Considering that the lockdown-type control measures in Poland started before the pandemic was announced (first lockdown-type control measures had started on 10 March 2020), the panic had also started well before the pandemic was announced.

The research project was reviewed and approved positively by the Ethical Committee (decision no. 29/2020) at the Institute of Psychology at the University of Gdańsk, Poland. Participants in the current study were obtained with a cooperation of a gatekeeper, which allowed access to the hospital. Participants

**TABLE 1** | Descriptive characteristics of the study participants.

Variables	N = 90
Gender	
Males	N = 23 (25.6%)
Females	N = 67 (74.4%)
Direct vs indirect exposure to patient	
Direct	N = 66 (73.3%)
Indirect	N = 24 (26.7%)
Specialization	
Yes	N = 48 (53.3%)
No	N = 42 (46.7%)
Age	M = 45.66 (SD = 9.70)
Number of years in the profession	M = 19.373 (SD = 11.29)

included in the study were hospital workers, without any psychiatric diagnosis in the past to the present, who agreed to participate in the study. Exclusion criteria included DSM-5 psychiatric diagnoses (American Psychiatric Association, 2013) and taking psychotropic medications. Psychiatric diagnoses were performed by a psychiatrist.

Recruitment of the participants involved a general conversation about the pandemic, which was meant to encourage the respondent to take part in the study. After agreeing to take part in the study, individual meetings were scheduled. During the meetings, participants were asked to fill out the questionnaires.

The following research tools were used:

1. Author's own survey including socio-demographic data
2. Author's own three-item anxiety scale concerning anxiety about coronavirus.

The respondents were asked to assess, on a scale of 0–10, how strong are their fears of COVID-19 in relation to: worries about themselves (I am worried about myself), worries about loved ones (I am worried about my loved ones), and fear of losing their job (I am worried about losing my job and poverty). Responses for all three items were summed up to create a composite measure in which higher scores reflect greater anxiety concerning the consequences of COVID-19. This is an author-designed tool, which has been standardized in relation to Hamilton Anxiety Rating Scale (HAM-A). Scores of 15 and above correspond with HAM-A scores of 18 and above, which is a commonly used cutoff score of anxiety disorders in clinical studies (Hamilton, 1959; Małyszczak et al., 1999; Kocjan, 2016).

A one-factor structure of the tool was tested via confirmatory factor analysis (CFA). Model's fit statistics show very good fit: CFI = 0.99, RMSEA = 0.001. Scale reliability in the current study was assessed using the Cronbach's alpha. The results of this measure equaled 0.77.

In addition, the measurement of COVID-19 anxiety was supplemented with a single item assessing concerns about coronavirus infection, i.e., "Are you worried about catching the coronavirus?" Study participants reported their concerns on a five-point scale: (1) Definitely not; (2) Probably not; (3) Probably



yes; (4) Yes; and (5) Definitely yes. On the scale, scores of 3 and above indicated fear of catching COVID-19; hence, we selected 3 as a cutoff score.

Considering a relatively small number of participants ( $N = 90$ ), we used a dichotomic classification of fear of COVID-19 for both scales. For the dichotomic classification, we used the cutoff scores and assigned 0 = no fear, 1 = fear. This could result less likely to creation of biased estimates than are more unbalanced dichotomies (Pedhazur and Schmelkin, 1991; Borz and Döhning, 2006).

General Self-Efficacy Scale (GSES), which is a 10-item psychometric scale that is designed to assess optimistic self-beliefs to cope with a variety of difficult demands in life. The scale was originally developed in German by Jerusalem and Schwarzer (1992). The total score a person can get is between 10 and 40 points. The higher the score, the higher the self-efficacy, which translates into greater self-confidence and better ability to cope with a difficult situation. Sten scores 10–24 points were regarded as low, 30–40 points as high, and 25–29 points as average.

A Polish version (Juczyński, 2012) has been shown to be reliable and valid (Cronbach's alpha equaled 0.85). Additionally, scale reliability was assessed by the author using the test–retest method (after 5 weeks) and equaled 0.78 (Juczyński, 2012); in the present study, Cronbach's alpha resulted to be 0.86.

The Courtauld Emotional Control Scale (CECS) (Polish version), which is a 22-item questionnaire developed to measure the extent to which individuals report suppressing emotions of anger, anxiety, and depressed mood. Subscales have been shown to be consistent with these primary emotions: anger, depressed mood, and anxiety. The total emotional control index is within 21–84 points. The higher the result, the more enhanced the suppression of negative emotions. The Polish version was found to be a reliable and valid method. The following Cronbach's  $\alpha$  coefficients were obtained: for the control of anger 0.80, depression 0.77, anxiety 0.78, and for the total emotional control index 0.87 (Juczyński, 2012), with our data Cronbach's alpha for the total emotional control index equaled 0.76.

Impact Event Scale-Revised (IES-R)—Polish version (Juczyński and Oginiska-Bulik, 2009) is a self-report measure that assesses a subjective psychological distress caused by a traumatic event. The principal component analysis identified three factors

(Intrusion, Hyperarousal, and Avoidance), which are closely associated with PTSD symptoms. The cutoff point is 30 points.

The Polish version was found to be a reliable and valid method. The overall scale reliability measured with Cronbach's alpha is 0.92; in the present study, Cronbach's alpha resulted to be 0.94.

## Data Analyses

Descriptive statistics were computed for the characteristics of the sample consisting of frequencies and percentages for categorical variables and means and standard deviations (SDs) for scale variables (Table 1). Parametric assumptions were tested before conducting parametric tests. Differences in levels of anxiety concerning the consequences of COVID-19 between males and females; professionals directly vs indirectly exposed to patients; and professionals with vs without specialization were assessed via  $t$ -test.

Before analyzing the correlation between variables, we assessed the normality of the distribution of variables on the basis of skewness and kurtosis (see Table 2).

The criterion set was  $< 2.0$ .

As there were no clear deviations from the normal distribution, we used the Pearson's  $r$  coefficient. Bivariate associations between study variables were assessed via Pearson's correlation coefficient  $r$  (Table 2).

A multiple linear regression was conducted to ascertain the effects of gender, being directly vs indirectly exposed to patients, and general self-efficacy on the anxiety concerning the consequences of COVID-19. We followed the hypothesis, and CECS is not the significant predictor, so we did not include it in the regression model.

## RESULTS

The majority of the respondents ( $N = 62$ ; 68.9%) reported being worried of catching COVID-19. The majority of the respondents ( $N = 84$ , 93%) also demonstrated a subjective distress caused by COVID-19 (only six individuals did not report them). The mean General Self-Efficacy GSES was relatively high in the studied group of respondents. The mean score of Control of Negative Emotion CECS suggests that the respondents had an average suppression of negative emotions. Table 2 contains descriptive

**TABLE 2** | Means, standard deviations, and correlation matrix of the study variables.

Variables	<i>M</i>	<i>SD</i>	<i>Skew.</i>	<i>Kurt.</i>	1	2	3	4	5	6
1. Age	45.66	9.70	−0.51	−0.32						
2. Number of years in the profession	19.37	11.29	0.05	−0.85	0.790**					
3. Fear of catching COVID-19	3.97	1.09	−0.63	−0.93	0.031	0.061				
4. Anxiety concerning the consequences of COVID-19	19.49	8.10	−0.20	−1.06	0.114	−0.040	0.478**			
5. GSES	30.66	3.82	0.66	1.45	−0.040	−0.090	−0.331**	−0.322**		
6. CECS overall	49.74	9.31	0.37	−0.03	−0.304**	−0.160	−0.040	0.030	−0.160	
7. PTSD overall (IES-R)	62.16	18.21	0.01	−0.70	0.239*	0.209	0.488**	0.348**	−0.253*	−0.140

$N = 90$ .

\* $p < 0.05$ .

\*\* $p < 0.01$ .

statistics and a correlation matrix (Pearson's correlation) of the variables studied.

Further analysis showed that women reported higher levels of anxiety concerning the consequences of COVID-19 ( $M = 20.82$ ,  $SD = 7.53$ ) than men ( $M = 15.61$ ,  $SD = 8.23$ ),  $t(88) = 2.76$ ,  $p < 0.01$ ; the difference is moderate (Cohen's  $d = 0.66$ ) (equal variance assumed  $F = 0.24$ ,  $p = 0.63$ ). Contrary to expectations, healthcare professionals directly exposed to patients reported lower levels of anxiety concerning the consequences of COVID-19 ( $M = 17.40$ ,  $SD = 7.92$ ) than those who were indirectly exposed to patients ( $M = 24.11$ ,  $SD = 6.53$ ),  $t(88) = 3.92$ ,  $p < 0.001$ ; the difference was high (Cohen's  $d = 0.92$ ) (equal variance assumed  $F = 1.20$ ,  $p = 0.23$ ). Healthcare workers with specialization obtained significantly lower mean scores for anxiety concerning the consequences of COVID-19 ( $M = 16.27$ ,  $SD = 7.32$ ) than workers without specialization ( $M = 22.57$ ,  $SD = 7.67$ ),  $t = 3.98$ ,  $p < 0.001$ ; the difference was high (Cohen's  $d = 0.84$ ) (equal variance assumed  $F = 0.31$ ,  $p = 0.58$ ). There were no significant differences between healthcare workers with and without specialization when PTSD symptoms overall score was compared ( $t = 1.56$ ,  $p = 0.12$ ).

## Linear Regression Analysis

A multiple linear regression was conducted with SPSS Statistics to ascertain the effects of gender, being directly vs indirectly exposed to patients, and general self-efficacy on the anxiety concerning the consequences of COVID-19. The results of multiple regression analyses showed a significant main effect of all predictors on the anxiety concerning the consequences of COVID-19, suggesting that female ( $\beta = -0.271$ ,  $p < 0.01$ ) healthcare professionals indirectly exposed to patients ( $\beta = -0.336$ ,  $p < 0.01$ ), who reported lower levels general self-efficacy ( $\beta = -0.295$ ,  $p < 0.01$ ) have a stronger tendency to respond with anxiety regarding the consequences of COVID-19 [ $R^2 = 0.301$ ,  $F(3,89) = 12.34$ ,  $p < 0.01$ ].

## DISCUSSION

The aim of this study was to assess the psychological resources, including coping self-efficacy and emotional control (of anger, anxiety, depression) of hospital staff with reference to the coronavirus anxiety and PTSD symptoms, once the coronavirus pandemic was announced in Poland. The study was conducted shortly after the restriction period in Poland has started, and it investigated the subjective assessment of COVID-19 threat and PTSD symptoms in the hospital staff, as well as identified protective factors of fear of COVID-19.

The COVID-19 pandemic was perceived by the group of hospital personnel (medical, technical, and maintenance staff) as a genuine threat. Majority of the respondents were worried of catching COVID-19. According to the stress-adaptation model, the experience of fear and stress is defined as a universally experienced response to extraordinary life circumstances (Maudner et al., 2003; Valdez and Nichols, 2013). The fear of catching the coronavirus may also stem from the high awareness of the hospital staff that the virus may be

absorbed by the cells of the mucus membrane in the eyes, nose, cheek—after which it changes its genetic code, multiplies, and transforms its own cells into the cells of the intruder. The virus is invisible and may be everywhere—in a patient's breath, on his clothes, items in his possession, and on everything he touched. It is easily transmittable. The hospital personnel might thus perceive the virus as a genuine invisible threat to them and all persons they get in touch with (including their close friends and relatives). This could explain their real fear of coronavirus. The perception of one's own situation as threatening may deepen insecurity. Usually, at the time of pandemic, infection monitoring procedures and public health recommendations are modified frequently. The changes may be introduced on a daily or even hourly basis, which explains the increased level of insecurity in the medical personnel. It seems that media broadcast also intensifies insecurity and anxiety. Research also suggests that the staff lacks both planning and strategic solutions for the community at various levels at the time of disasters, which also intensifies insecurity and anxiety when facing a threat (Roudini et al., 2017). Moreover, when faced with a disaster, individual fear behaviors spread rapidly and contagiously, among groups of persons who share the fear and observe the behaviors of each other (Espinola et al., 2016; Shultz et al., 2016). Finally, the fear of COVID-19 may also be related with stigmatization of healthcare workers, others' fear of contact with those treating patients with COVID-19 (Ramaci et al., 2020). We could observe similar fear-related behaviors in the years 2013–2016 during the West Africa Ebola Virus Disease Outbreak (Espinola et al., 2016; Rabelo et al., 2016; Shultz et al., 2016).

Widespread outbreak of COVID-19 is associated with psychological distress and symptoms of mental illness (Bao et al., 2020; Rajkumar, 2020; Super et al., 2020; Vindegaard and Benros, 2020). Work-related mental health impairment is recognized as a real problem in the context of helping responders, including health professionals, due to adverse health outcomes after a severe disaster (Neria et al., 2011; Farooqui et al., 2017; Nukui et al., 2018). Recent studies have shown that among healthcare workers depression and anxiety rates were higher (Chen et al., 2020; Mo et al., 2020) compared to administrative staff (Lu et al., 2020; Zhang et al., 2020) and non-frontline workers (Liang et al., 2020; Vindegaard and Benros, 2020), during the COVID-19 pandemic (Xu et al., 2020). We observed differences between workers directly exposed to patients and those indirectly exposed to patients. Despite the fact that workers directly exposed to patients are more prone to being directly exposed to COVID-19, they experienced coronavirus-related worries less frequently than workers indirectly exposed to patients, as well as healthcare workers with specialization obtained significantly lower mean scores for anxiety concerning the consequences of COVID-19 than workers without specialization. This could be explained by their awareness of having a job which is strongly socially desirable, as well as awareness of their own skills and the sense of self-efficacy. Some research has shown contradicting results, i.e., female nurses in Wuhan working in the front-line medical staff were twice more likely to suffer anxiety and depression than the non-clinical staff (Lai et al., 2020; Lu et al., 2020). In those studies, however, studied nurses have had close contact

with COVID-19 patients. In the present study, the medical staff could potentially have had a direct contact with patients infected with COVID-19, yet there were no cases of COVID-19 registered in the hospital.

In the current study, gender was another variable that turned out to be a significant predictor to respond with anxiety regarding the consequences of COVID-19. Some studies have revealed that female gender and younger age are some of the risk factors of anxiety (Norris et al., 2002; Frankenberg et al., 2008; Math et al., 2015; Sohrabizadeh et al., 2016; Vindegaard and Benros, 2020). Younger persons and women are also more likely to develop that stress disorder when faced with a disaster (Adams and Boscarino, 2006). Similarly, disaster rescue workers are at high risk of developing psychiatric morbidity (Stellman et al., 2008).

In the current study, the vast majority of the participants (apart from six respondents) declared PTSD symptoms. A mass threat is a potentially traumatic event (PTE) that threatens or overtly endangers the physical and/or psychological health, well-being, and integrity of a population and that is perceived and experienced, both individually and collectively, by persons comprising the population at risk. PTEs, regardless of whether they result in physical harm, have the capacity to produce psychological distress and, with severe or prolonged exposure, PTSD (Espinola et al., 2016). It is worth emphasizing that not all respondents declared being anxious of COVID-19, and not all of them had the PTSD symptoms. Although researchers have assigned the PTSD as the signature diagnosis among post-disaster mental morbidity, the incidence of PTSD reported in literature ranges from 4 to 60% (Pietrzak et al., 2012; Brooks et al., 2019). The level of PTSD symptoms was correlated with age, sense of self-efficacy, and fear of catching COVID-19 and anxiety concerning the consequences of COVID-19. There was no significant relationship between gender and PTSD symptoms scores.

Nowadays, the workplace environment is not supportive in Polish hospitals, especially at the time of COVID-19 pandemic, because currently Polish healthcare centers suffer from acute lack of the necessary protective measures, including protective masks, disposable gloves, protective coats and coveralls, and disinfecting liquids. We assumed that emotional control would be a significant factor protecting against the PTSD symptoms and fear of COVID-19. The obtained results do not confirm this assumption. Only age negatively correlated with emotional control. Younger age supported the control of negative emotions, which could be due to greater adherence to the professional workplace norms, which favor emotional control and discourage expressing negative emotions (anger, anxiety, depression) when at work in a hospital. The control of negative emotions decreased with age. The obtained results are consistent with Averill's (2004) review. According to Averill (2004), the diversity of emotions experienced by a person results from the possession of various cognitive emotional programs of responding to events. Cognitive emotional patterns are inborn, but they develop and change under the impact of life experiences. Emotions are a kind of social role. Controlling them means being emotionally correct, which is a condition of high emotional intelligence (Averill, 2004). The fact that the hospital staff

do not always control negative emotions or admit much more easily to it may be due to the general life experience growing with age. Expressing negative emotions is beneficial and recommended in various psychotherapeutic approaches (Salovey et al., 2002).

We assumed that the sense of self-efficacy will be a significant resource in the light of the COVID-19 pandemic. The GSES scores were negatively correlated with fear of catching the coronavirus as well as anxiety concerning the consequences of COVID-19. The sense of self-efficacy of hospital personnel is based primarily on their education, practical skills, and expert knowledge, so even lack of external resources, such as protective masks they have, face shields, goggles, disposable gloves, protective coats and coveralls, and disinfecting liquids, does not lower the sense of self-efficacy in all hospital staff groups. Anxiety has been shown to increase sensitivity to work pressure and the working environment and has a negative effect on self-efficacy because it reduces positive behaviors and initiative (Bandura and Adams, 1977; Miller et al., 2006; Xiao et al., 2020).

## Strengths

The main strength of the study is that it was conducted 2 days after the COVID-19 pandemic had been announced in Poland, which controls the limitations that often arise in retrospective studies. Furthermore, it was conducted in a non-artificial environment—at the workplace, with direct researcher–respondent contact. The study group consisted of the staff from one hospital, who were directly, as well as indirectly, exposed to patients. Personnel not commonly involved in research, such as maintenance workers, were also included in this study.

## Limitations

The limitations of this study include a sample that is limited to the personnel in only one hospital in the Pomeranian region, Poland, which makes it impossible to generalize the conclusions to hospital staff from other hospitals. Moreover, the current study investigated symptoms and/or signs of PTSD rather than PTSD. It is hence impossible to ascertain whether the respondents suffered from PTSD or only experienced the symptoms of PTSD. In order to diagnose PTSD, a full psychiatric assessment would need to be conducted.

Conducting the study just 2 days after the COVID-19 pandemic had been announced in Poland can be a strength as well as a limitation. Considering that the media broadcast has been intensifying insecurity and anxiety since the first case of COVID-19 had been reported in Wuhan City, it seems that the “coronavirus fear” in Poland had started before the pandemic was announced, yet this is only an assumption. Symptoms of PTSD usually manifest within the first 3 months after the trauma, hence not enough time might have passed for some of the respondents to manifest PTSD symptoms. It is also difficult to ascertain without a psychiatric examination whether the respondents had PTSD symptoms or acute stress disorder (ASD) symptoms. PTSD refers to the long-term aftermath of trauma (when the symptoms last longer than a month), while ASD refers

to the initial traumatic symptoms that arise immediately after a traumatic event (Bryant et al., 2000a,b; Bryant and Harvey, 2002). PTSD can follow ASD, but it can also occur even when ASD does not develop.

## CONCLUSION

The findings show the importance of self-efficacy for dealing with COVID-19 anxiety. The internal coping strategies should be introduced to healthcare workers as a part of the psychological preparation and health management to increase the psychological resilience of the hospital staff. Research has shown (Stueck, 2007, 2009; Stueck and Villegas, 2008; Stueck et al., 2019; Parker et al., 2020) that stress reduction methods combined with body orientation, e.g., breathing meditation and Autogenic Training, has a positive effect on self-efficacy. It seems that introducing a modern biocentric and psychological disaster management approach into hospitals could prepare the hospital staff to better deal with a pandemic or crisis.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Board for Research Projects at the Institute of Psychology, University of Gdansk, Poland. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MoB and IB-B contributed to conceptualization, methodology, formal analysis, writing, and original draft preparation. AS-W contributed to conceptualization, investigation, and project administration. MS contributed to conceptualization, writing, and original draft preparation. MaB contributed to conceptualization, methodology, formal analysis, writing, original draft preparation, and supervision. All authors contributed to manuscript revision, read, and approved the submitted version.

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# Unmasking Reflexivity in HR Managers During the COVID-19 Lockdown in Italy

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This paper explores how some Italian HR managers narrate the changes imposed by the COVID-19 threat in the workplace. Events since December 2019 have presented exceptional circumstances to which HR managers have reacted in very different ways. This study explored how HR managers came to introduce organizational changes aimed at coping with the emergency, as well as how employees were involved in those organizational changes. The article is based on a thematic analysis of some interviews with Italian HR managers whose companies decided to switch working from home on a massive scale. We wanted to offer some reflections on the actions taken by a few HR managers and Italian companies to keep working at a time when most workers were forced to respect the lockdown.

**Keywords:** organizational change, crisis management, HR managers' reflexivity, qualitative approach, thematic analysis

## INTRODUCTION

Over the weekend before Monday 10 March 2020, Italian society, its companies, and economy stopped almost entirely. Offices, factories, and shops were closed. Traveling around the country by car or train was forbidden, and street police checks and heavy fines were introduced for those who did not respect the rules. During that period of quarantine, from the beginning of March to the beginning of May, many changes took place in the workplace. Which of these changes will remain, and which will be abandoned? In this situation, what happened to managers, workers, and jobs?

When the lockdown quarantine began, the glittering white-collar office towers designed by architects fell empty and a large-scale unplanned experiment began. Politicians, the media, and workers called it "smart working." To be precise, however, this was not "smart working"<sup>1</sup>. What was witnessed and experienced was working from home or working at a distance. In those months, millions of Italian workers stayed away from their workplace. The pandemic made it necessary to organize numerous activities, requiring interpersonal collaboration through video-based business meetings. Facebook, Microsoft, and Google decided to resort to remote working on a massive scale, until after the summer. Some firms went even further and for example, at the social media company, Twitter employees were allowed to work remotely indefinitely. Working from home was one of the

<sup>1</sup>Throughout this article, we call it "smart working" because this is the term which has been used by the press in Italy to describe this particular way of working. However, it was not the "true smart working" which involves the possibility of carrying out work activities in places other than the company headquarters or the home (for example on a train, in a park, in a library). It was not even teleworking which, to be such, requires the intervention of the company in the employee's home in order to create a specific space where the work activity is carried out.

many possible ways to react to the emergency, which involved a transition for millions of workers who had never experienced this way of working before.

This study aims to explore how some Italian HR managers narrate the changes imposed on the workplace by the restrictions of the COVID-19 pandemic. What has happened in the world since December 2019 has been an exceptional event to which HR managers have reacted in very different ways. We were interested in understanding how HR managers came to introduce organizational changes aimed at coping with the emergency, as well as how employees were involved in those organizational changes. The article is based on a thematic analysis of some interviews with Italian HR managers whose companies decided to resort to working from home on a massive scale. We wanted to offer some reflections on the actions taken by a few HR managers and Italian companies to keep working at a time when most of the workers were forced to respect the lockdown.

## THEORETICAL FRAMEWORK

### The Crisis Management

This paper draws on theories of crisis management to understand how companies and HR managers deal with exceptional situations/events. According to Giust-Desprairies (2005), a crisis presents itself as an unexpected event, upsetting the *status quo*. From a psycho-sociological perspective, several aspects characterize the experience of a crisis: emotional overload; a sense of uncertainty and loss; disorientation, and disengagement. At the organizational level, crisis usually brings to the fore certain issues, needs, and expectations that were previously overlooked; the framework and knowledge used for orienting thoughts and actions lose significance and relevance and people feel continuously threatened. Consolidated leadership and balances of power vacillate and conflicts and divergent opinions may suddenly emerge. Coordination systems get jammed. Crisis confuses people, and decision-making can be blocked, or instead dominated by reactive and impulsive stances. People often ask themselves what makes sense. The individual and collective imaginary seem to “freeze,” and the future appears as a never-ending present, characterized by a continuous escalation of emergency (Hsiu-Ying Kao et al., 2020; Galuppo et al., 2019). The COVID-19 emergency can be narrated by HR managers as either an irreversible crisis or as a temporary one. In the former, it is represented as a tsunami, which changes (and changes radically) ways of working, managing human resources, and imagining the development systems for evaluating people. According to this perspective, the world (and global business) will never be the same after the pandemic. In the situation in which the crisis is seen as temporary, there is a risk that the change will only be superficial, and the transformation generated by the threat is temporary: it is an ephemeral transition.

It is useful to ask how organizations and HR managers can learn from a crisis. One suggestion comes from theorists in the field of organization studies who have studied critical reflexivity. We are thinking, in particular, of the works of Cunliffe (2003), Alvesson (2003), Ripamonti and Galuppo (2016),

Ripamonti et al. (2016, 2018), and Caetano (2015) who emphasize the important role and contribution of reflexivity to management and organizational learning (Cassell et al., 2019). As Cassell et al. (2019) wrote, the literature on this topic outlines a variety of benefits that come from reflexivity, including “enabling us to think about our thinking, and in questioning our own taken-for-granted beliefs and those of others” (p. 3). Managers and employees can learn to cope with extraordinary situations - crisis or emergency situations - that involve stopping and/or slowing down (Stewart, 2007) without making a rapid assessment and taking action, without discarding what is not entirely comprehensible or fully understood (Benozzo and Gherardi, 2019). Although difficult, situations that are anxiety-provoking and confusing can be fruitful and enriching.

The themes evoked by the COVID-19 crisis are linked to literature on crisis management, and this literature has pointed out two important issues which organizations face:

- *Influencing external stakeholders.* This issue relates to how external communication with stakeholders is managed, including which messages to send them to indicate the organization’s ability to manage the unexpected crisis event. Usually, in the context of a crisis, great attention is paid to how stakeholders react to a critical event and to how information about the organization involved is managed.
- *Internal HR management dynamics.* This issue focuses on how the organization manages three specific moments: the pre-crisis, crisis management, and the post-crisis event. The possibility of learning from this crisis management process depends on the cognitive and emotional skills and abilities of the managers involved (Pearson and Mitroff, 1993; Alpaslan et al., 2009; Williams et al., 2017).

The ability of HR management to place issues connected to taking care of people at the center of the business strategy makes it possible to implement adequate, suitable responses to environmental requirements (Bader et al., 2019). Taking care of employees is also connected to how HR management influences sensemaking processes (Weick, 1999; Velasco et al., 2013). Some authors (Hewett et al., 2017) have argued that there can be significant differences in perception of the same event between the various groups of company population. Often, the way that a critical event is interpreted can be different between managers and employees and generate situations of conflict.

In literature on crisis management, one of the central themes is internal communication. As Hewett et al. (2017) have pointed out, this means that, when dealing with critical situations, HR management must ensure that communication is transparent, clear, and authentic. This should ensure that messages regarding the aims and procedures of HR policy are correctly understood by line managers and that these are then passed on to collaborators. A positive perception of the action taken by management in the face of a problematic situation has a positive impact on organizational performance (Pombo and Gomes, 2019).



## Crisis Management in the Period of COVID-19

COVID-19 is a crisis event of exceptional nature since it has affected all organizations, thereby creating a negative impact on every single organization simultaneously. In this scenario, our focus is on the role of HR management, which the literature on crisis management has always identified as being the most significant factor in influencing the capacity of an organization to react in the face of critical events. We concentrated attention on the management actions implemented by the HR department. Our research question was aimed at understanding how HR departments gave meaning to what was happening and how they built people management strategies to cope with the crisis. The issue of the relationship with stakeholders was left in the background, since COVID-19 is an event that, for the first time, has affected every organization simultaneously and brought turbulence to the whole system, meaning that organizations were left to themselves to manage internal problems. It was thus impossible to devote time and resources to dealing with external stakeholders, who were themselves having to cope with the same dramatic problems.

### The Management of Human Resources

The issues raised by the COVID-19 situation that HR management has had to deal with can be summarized as follows:

#### Stress Management

This has become a priority in the period of COVID-19. A study published on March 23, 2020, of 1257 healthcare workers in 34 hospitals in China (Lai et al., 2020) found a high prevalence of mental health symptoms among workers. Rates of psychological suffering were high: 50.4% had symptoms of depression, 44.6% of anxiety, 34% of insomnia, and 71.5% of psychological distress. The perception of not being able to respond to the increasing demands of the job during the COVID period generates a feeling of performance anxiety (Shanafelt et al., 2020). This feeling may cause a collapse in motivation and performance when the stressors exceed people's endurance (Vogel and Bolino, 2020).

#### Management of Internal Communication

Clear, transparent communication is the primary goal during periods of crisis. Some recent studies (Garfin et al., 2020; Rao et al., 2020) on the effect of people's repeated exposure to communication regarding the COVID-19 pandemic suggested that ambiguous messages cause increased anxiety and stress. In the COVID-19 situation, it was impossible to transmit clear messages and unambiguous responses to questions such as: "What will happen if someone is infected? Would it be possible to work from home with the same level of protection?" (Dragging et al., 2020). However, despite this lack of information, HR managers had to adopt a position and continue to give directives to company staff.

#### Generating a Supportive Atmosphere in the Workplace During the Crisis

Hou et al. (2020) studied the mental health of healthcare workers in China during the period of COVID-19. The latest research on the global pandemic indicates that the worker's perception of

social support is a protective factor that helps to contain stress. When workers are convinced that their colleagues can help them, their resilience capacity increases (Hou et al., 2020).

All these tensions have been interpreted in different ways by different organizations. Some managers have focused on ways of reassuring people. Some of the proposals reported in the literature include meditation, yoga, and stress management courses (D'Angelo et al., 2018). These experiences might have a positive influence on how future emergencies are dealt with (Hou et al., 2020). Other organizations have devoted their energy to creating a reassuring organizational environment. Yet others have tried to insist on internal communication, sending reassuring messages to their employees. A wide variety of actions have been implemented to try to deal with the pandemic, but the choices of which actions to implement depend on the meaning which the managers (and in particular those in charge of HR) attributed to the COVID-19 pandemic as an event. The specific function attributed to HR managers is to manage relations with personnel.

### The Reflexive Function in HR Management

The COVID-19 emergency can be narrated by HR managers as either an irreversible crisis or as a temporary one. In the former approach, it is represented as a huge and sudden change, which will radically change ways of working, managing human resources, and imagining the development systems for evaluating people. According to this perspective, the world (and global business) will never be the same as before the pandemic.

In the latter narration, when the crisis is seen as temporary, there is a risk that changes will only be apparent or superficial, the transformation generated by the threat is temporary, and that this is an ephemeral transition. Once the crisis has been overcome, the organizational structure folds back on itself, because organizations are characterized by inertia, by a lack of flexibility (Gagliardi, 1986). In this second case, the role of the HR manager is to use logical arguments to convince people and contain their anxiety. In this case, there is no deep leaning or change and a return to normal is desired. Unfortunately, and paradoxically, in this situation, this mindset is not aware that normal behaviors are exactly what generated the crisis.

It is useful to ask how organizations and HR managers can learn from a crisis. Organization studies on reflexive practice, in particular of the works of Cunliffe (2003), Alvesson (2003), Ripamonti et al. (2016), and Caetano (2015), emphasize the important role of reflexivity to management and organizational learning (Cassell et al., 2019). As Cassell et al. (2019) wrote, there is literature that outlines a variety of benefits arising from reflexivity, including "enabling us to think about our own thinking, and in questioning our own taken-for-granted beliefs and those of others" (p. 3).

We refer to reflexive practice by identifying it as the ability to generate new perspectives and insights (Alvesson et al., 2008) and create scope for re-constituting the self (Cunliffe, 2003). Recently, the concept of reflexivity has been utilized in a whole series of organization studies (Chia, 1996; Holland, 1999; Weick, 1999; Antonacopoulou and Tsoukas, 2002; Alvesson, 2003; Alvesson et al., 2008; Cunliffe, 2009; Segal, 2010; Xing and Sims, 2012) to describe that process that allows people to think about

themselves in their workplace by implementing a strategy of distancing themselves from the contingent situation. The aim is to activate a kind of thinking about which assumptions are used when implementing specific organizational actions (Lewis and Kelemen, 2002; Vince, 2002; Johnson and Duberley, 2003; Schippers et al., 2008; Jordan et al., 2009).

Reflexivity can be thought of as an “internal conversation” that organizational actors use to think about events that occur and to overcome the obstacles they encounter (Archer, 2007; Kakavelakis and Edwards, 2012). Through reflection, people evaluate their social contexts, imagine possible alternatives for their actions, and work with others to make organizational actions happen. In Archer’s perspective, reflexivity is an actor’s ability to build strategies for action. Strategies that take into account the actor’s position within a social system, to be able to act through tactical and strategic thinking. In this paper, we connect the concept of reflexivity to Emirbayer and Mische’s concept of agency (1998) – the ability to influence the surrounding world based on one’s ability to interpret the peculiarities of the context in which one finds oneself – which brings a temporal perspective to the discussion.

According to Emirbayer and Mische (1998), agency can refer to three temporal orientations, in the past (iteration), future (projectivity), and present (practical evaluation). In their own words, all “three of these constitutive dimensions of human action are found at various levels, within each concrete action” (Emirbayer and Mische, 1998: 171). In any given situation, however, one of these predominates, while the other two are present in a latent state. In the case of iteration, the authors refer to the selective reactivation of past thought patterns by organizational actors. Projectivity, on the other hand, involves the reconfiguration of acquired thought patterns to deal with plans. Practical evaluation concerns people’s ability to organize action in response to problems and requirements emerging in the present (Emirbayer and Mische, 1998).

We may encounter an iterative type of reflexivity that tends to select practices or thoughts from the past to deal with emerging problems. We may also encounter a kind of reflexivity centered on the present, and aimed at understanding which implicit assumptions are being used to deal with contingent problems. We may also have a style of forward-looking reflexivity, adopted to organize future strategic action.

The type of strategies chosen by HR managers therefore depends on their reflexive capacity and priorities. Bringing into play an iterative agency mainly involves thinking about which models from the past can be used to deal with the critical situations developing today. Using an approach centered on projective agency (forward-looking agency) means recognizing that the crisis has reconfigured the organizational field of action. It, therefore, becomes necessary to completely redesign how the work and the organization are conceived to guarantee survival in the medium and long term. Implementing a “practical” style of agency means placing oneself in the present and taking actions that solve strictly topical problems. In our opinion, where one positions oneself in one of these three types of agency also depends on the type of reflexive

thinking to which the protagonists on the organizational scene gain access.

The priorities for action are identified by each manager’s reflexive capacity, which might favor a way of managing that is either oriented toward the past, reorganizing the present, or one which is forward-looking and focused on creating new work scenarios. For HR managers, the potential for achieving distance from the critical situation of COVID-19 depends on their critical and reflexive capacity.

## METHOD

The present research aimed to explore how HR managers made sense of the COVID-19 crisis, with specific regard to people management and its related changes and challenges. The study takes the form of a brief qualitative research report, whose preliminary findings are based on 10 semi-structured interviews conducted with Italian HR managers whose companies decided to resort to large-scale smart working. These multifaceted data allowed us to gain initial insights into how HR managers from different contexts spoke about the situation and made meaning from the challenges it presented.

Given the exceptional nature of the ongoing event, in the course of our research, we met up with HR managers who were willing to undertake an interview. It was not possible to proceed with a statistical sampling that took into account variables such as age or gender of the interviewees or the size of the organization. The participants in the study work in companies in the North of Italy and were identified thanks to the researchers’ network of acquaintances and by word of mouth. This process generated a convenience sample. All the interviewees gave written consent to the recording the interview and to participating in the research. All the interviews were transcribed verbatim.

Since we do not consider the narratives used by the participants in our study as representative of the HR managers’ narratives during COVID-19 lockdown in Italy, other studies are needed in this field, such as those that take into account the opinions of managers working in different or similar sectors.

The semi-structured interviews consisted of a series of open questions, organized into five main sections: a brief overview of the organization; how the organization was dealing with the current crisis; the role of HR in the COVID-19 emergency; perceived challenges, resources and criticalities in “managing people” during the crisis; expectations and predictions about the future.

## Data Analysis

Data were analyzed using a theoretical thematic analysis (Braun and Clarke, 2006), driven by the research question. The analysis aimed to identify the main themes and meanings through which the HR managers’ narratives could be organized and interpreted. The analysis was conducted as follows: in a first phase, after becoming familiar with the data, we organized them through an open coding process, in which we were driven by the research question and by the “sensitizing concepts” described in the theoretical framework (Maguire and Delahun, 2017). We then

organized the codes into broader themes that were consistent with the research question. These themes were reviewed several times, by going back and forth to the coding process. The next section presents the themes discussed by HR managers during the interviews.

The first theme regards the time orientation of managers' actions. Managers described their commitment to cope with the present situation and to make decisions about the future. Some of them seemed focused on the present, and on the task of defending the company and its employees from threat, by trying to limit permanent damage to the organization's capacity for survival. From the reflections of other HR managers, the belief emerged that, due to the huge crisis, the real battle was with the future and opportunities to introduce changes that might increase the ability of the company to develop.

The second area, on the other hand, distinguished between two different ways of reacting to the emergency, one conservative and the other transformative. The former tended to emphasize the possibility of re-establishing the pre-COVID situation, and it thus becomes important to devote the maximum amount of energy to keep the organization alive and wait for the crisis to pass. The latter way of reacting expressed the conviction that we are witnessing a reconfiguration of today's world of working. The thoughts of these managers were to focus on opportunities to anticipate the transformational lines which will guide new ways of working and thinking about these organizations.

Bearing in mind these themes, we tried to reconstruct the routes of meaning which guided the managers' behaviors while they were coping with the COVID-19 emergency. Altogether, three lines of development were identified, based on the managers' shared priority and attention to the initial impact on the companies, during the 2 months when the pandemic first began.

Starting from this collective and generalized attention to contain the emergency damage, we singled out various tendencies

in the development of the managers' behaviors, which were directed in very different ways. The hypothesis is that each of these tendencies is the basis of a similar number of relationship models and expresses the different forms of reflexivity of the HR managers."

The following discussion captures details emerging from the data analysis, summarized in **Table 1**.

## RESULTS

### Surviving and Support

Analysis of the data provided a fascinating insight into the efforts of HR managers to deal with the impact that COVID-19 had on their employees. The first focus, also because of the number of citations and categories which emerged, regards a fundamental question that guided all the HR managers on how to support the women and men within their organization. Instead of various concerns regarding the hard aspects of the organization, this first category emphasizes individuals and the actions that must be activated with maximum priority in order to limit the emotional impact of COVID-19 and to preserve people's psychological and physical health.

The supportive actions conceived by the HR chiefs regard four main topics:

#### 1. The stress impact arising from the increased workload

Since working from home has a stronger impact in terms of time and stress than office working, it is essential to support people, firstly, by recognizing the value of this additional work and then eventually by adjusting the workload (Gozzoli et al., 2018).

"Today we are seeing a significant increase in the total workload, which is crushing us [...]. We need to think about regulations to reduce the possibilities of creating alienation.

**TABLE 1** | Different forms of reflexivity of the HR managers.

	Interview extracts	Role of human resources (employees)	Type of reflexivity	Type of agency	Time orientation
Surviving and Support	"We have set up a system of psychological support with psychologists who are assisting us with helping staff who have experienced the death of a colleague in the company to work through the grief. We introduced this psychological support system about a week ago. Obviously, I can't talk about what people were saying, but they were telling me that the real issues at the moment are anxiety, anguish and fear."	To comply with HR managers' rules for coping with emergencies	Problem-oriented reflexivity	Practical evaluation	Present
Back to the past! The old reassuring models	"There was a shift of focus: first there were inspection activities, involvement-style, and then we . . . took action emphasizing the safety issue; we did a huge job on safety awareness. There was rethinking about the role of leaders, from controlling safety sanctions to safety services."	To adapt themselves to the demands from top managers	Blocked reflexivity	Iteration	Past
New organizational scenarios	"Using robotics and IT in order to limit physical contact, and automation, are all trends that would have happened anyway, but which are now speeding up. As always, there are activities that disappear, and others that are on the rise."	To adapt themselves to the role required by the models proposed	Blurred reflexivity	Iteration	Future
Crossing the Bermuda Triangle with bearings	"We trained influencers to prepare people to return to the office and help them to understand how we can help build a new way of working."	Make a contribution to understand how to bring about a new way of organizing	Projective reflexivity	Projectivity	Future

Having started with 150 requests for help before the pandemic, now we are receiving 1000 requests. At the people support level, the emergency situation has meant that requests for help have multiplied. It's an incredible situation, an enormous number of questions in need of an answer!"

## 2. People and time management

In this second area, the focus is on time management. It is not easy to restructure an individual's work life and to plan daily work from home. The timing of work and the overlap of different aspects of work and personal life are a great source of stress and difficulty. One of the themes is the struggle to separate working time from the time when we usually do not work, compared with traditional organizations, work is becoming more pervasive: "I know people who start work at 6.00 in the morning. The main topic is how to organize time."

## 3. Limiting employees' fear

The third category of supportive actions regards the handling of fear, the spread of COVID-19 having generated a common dread, which leads management to take responsibility for it. Actions directed at overcoming fear usually involve specialized figures such as psychologists.

"We have set up a system of psychological support with psychologists who are assisting us with helping staff who have experienced the death of a colleague in the company to work through the grief. We introduced this psychological support system about a week ago. Obviously, I can't talk about what people were saying, but they were telling me that the real issues at the moment are anxiety, anguish, and fear."

This first group of managers seems to deploy an agency linked to the present and oriented toward tackling the practical problems posed by the pandemic. Emirbayer and Mische (1998) use the term "practical evaluation" to describe this type of agency, which is strongly anchored in the present and designed to find solutions that can make it possible to survive in the contingent situation. This is the first form of reflexivity which, though anchored to the imminent threat of situations, can still maintain a minimum distance to activate a form of thinking open to "problem-solving" and bringing into play all the resources which the organization has available.

## Back to the Past! the Old Reassuring Models

This cluster comprises the portion of respondents whose description of the crisis emphasizes the tragic aspect of the events which were unfolding and highlights the need to limit effects through strong actions on the part of HR. Therefore, HR was re-established as playing a central role involved in guiding people in the right direction and, at the same time, containing and limiting psychological breakdown in employees.

The key shift is that this critical situation brought about a radical change in the balance between people and the organization, a change that has the potential to produce undesirable results, such as lack of engagement, reluctance to respect burdensome new safety rules, and diverse kinds of opportunistic behavior. As such, it is only possible to overcome

the crisis by establishing a strong, authoritative leadership, which people can look to as a point of reference. This is all reminiscent of certain old-fashioned management models that still exert a reassuring, seductive power. The way through the crisis involved escaping into the past and re-evoking cultural lifelines which are attractive for their apparent clarity and the central role attributed to the company's directors. In this cluster, there was an absence of research areas and detailed study to understand which elements might be needed to cope with the crisis.

"There was a shift of focus: first there were inspection activities, involvement-style, and then we ... took action emphasizing the safety issue; we did a huge job on safety awareness. There was rethinking about the role of leaders, from controlling safety sanctions to safety services."

This is where we can place those managers who express a form of iterative agency, based on resorting to a managerial style that is obsolete, but endowed with strong emotional appeal. In this group of managers, it would seem to be impossible to put any real distance in place from the situation they are experiencing to make room for "reflexive thinking" and produce thinking of a questioning and exploratory nature. The reaction of these managers seems to be based on the irresistible attraction of emotionally reassuring models of the past, even when these are oversimplified and historically outdated (Benozzo and Colley, 2012).

## New Organizational Scenarios

In this third category, the themes raised in the interviews centered on a significant reconfiguration of work organization, starting from different data assumed as strong points of reference. What emerged was a responsive vision that focused on enhancing organization in the medium to long term. Furthermore, the objective was to adopt changes and modifications with regard to hard organizational aspects which would make it possible to adapt to new scenarios, all the while avoiding any radical processes of change.

The basic idea here is that once the critical phase is over, organizations will re-establish the "status quo" before COVID-19, with a few changes in ways of working, but nothing radical. The managers included in this cluster reflect on what the organizations will be like in the future and do not expect any fundamental transformations. They indicate that the crisis will have significant consequences for the financial situation of the companies, and also that if the economic recovery is slow, there will be an impact on staff numbers. Organizations will therefore be dealing with two stages (slow recovery and permanent/final recovery) connected to economic stability, which will likewise be guaranteed by downsizing companies.

The respondents' leading hypothesis is that it will be necessary to identify innovative organizational models, which will make it possible to rethink work organization, for example in an asynchronous modality. Employees will not be allowed to work all together in the same office or workspace, smart working will be widespread, and input from the IT sector will be crucial to provide the necessary support for these new remote modes of working. In short, new organizational models will have to be found which can keep pace with organizational change. The fundamental concept of this cluster is that the main task that



people will face is that of adapting. The new modes of working will require a recalibration of timing and patterns of interaction that will not always cater to individual sensitivities and needs.

“Using robotics and IT to limit physical contact, and automation, are all trends that would have happened anyway, but which are now speeding up. As always, there are activities that disappear, and others that are on the rise.”

Even though these managers employ future-oriented thinking, the question they ask themselves leaves little room for the contribution of other people in helping to design how the work organization might be changed. They pin their hopes completely on IT, which will find new modes of working thanks to technologies capable of regulating how people interact in a new way. The thinking involved in redesigning the future is delegated to IT engineers and planners. It would appear, then, that here the managers are deploying a projective agency, but one in which reflexive thinking is depleted in its creative force.

## Crossing the Bermuda Triangle With Bearings

The third pertinent area regards exploring unexpected scenarios. Assuming that the ongoing situation represents a profound change, the productive modalities and the timing of working have reached a point of no return. Work organization has its roots in production that adopt synchronous modalities and working in-person. It will be necessary to shift toward asynchronous productive models with an accompanying reduction in face-to-face people collaboration. This means that fundamental questions emerge regarding just how that legacy of relationships, upon which work organizations are historically based, can be preserved.

Trust-based relationships between people and a sense of organizational belonging are the foundations upon which companies build their competitive advantages. Acknowledging that the big question is how to identify innovative asynchronous organizational scenarios, the next challenge is how to preserve the legacy of trust between people. The concepts of this cluster regard the possibility of finding organizational devices that would allow people not to lose their central place in the work process.

By way of example, several HR directors thought about making so-called “company influencers” available, namely a coach who could support staff in the process of returning to work and help maintain involvement and commitment. The key issue was how to reflect on new conditions of cooperation to return together to a job that will be different. The main characteristic of this fourth cluster is that none of the HR managers had the answers to the questions outlined above and the only chance of finding them is to highlight some potential areas for future research paths that are emerging from the activation of people within the organization. Indeed, a contextual hypothesis could be identified so as to continue to enable them to work together.

“We trained influencers to prepare people to return to the office and help them to understand how they can help (is that right? or how to build?) a new way of working.”

Here we find a form of projective agency, and reflexivity is projected into the future. In our opinion, it is here that we find

the highest form of reflexive thought capable of projecting people out of the contingent situation. The questions which guide the managers’ thoughts are strongly projected into the future, and they are linked to a potential fundamental reshaping of the way of working. They lead in turn to new questions that cannot be resolved in the short term because they need time and space in order to be addressed, and they are questions that are difficult to answer on one’s own, using pragmatic thinking. They can only be addressed by bringing into play a kind of imaginary thinking constructed together with one’s colleagues.

## DISCUSSION

The present study interviewed a group of HR directors who responded to the impact of the COVID-19 crisis. They were all in charge of managing various workplaces, departments, and factories. Two main issues were raised during the interviews. The first is related to how managers coped with feelings of *uncertainty* in the crisis. The second regards the link between change management and reflexivity.

### Uncertainty

The role of the people in the scenarios outlined above led us to identify three types of managerial behaviors in respondents. We should point out that the first “survival and support” cluster is common to all of the respondents. All responses showed a great deal of attention to people and to the possibility of “defending” and “supporting” them using every available tool during the COVID-19 pandemic.

This study identified three types of managerial behaviors that pointed to a different conception of the processes of organizational change and the role of people. The first type of behavior occurs over a brief timespan and expresses a style of thought that is unable to accept the change taking place. The impact of the emergency generates a “freezing” of thinking and a collapse into a never-ending present, in which the only way out is to escape into a reassuring mythical past in which the re-appearance of old management models centered around the “strength” of the manager seems to provide relief (Alfes et al., 2019). The second type of behavior projects itself into the future, placing its trust in the hope that collaboration between IT and management engineers will produce new organizational models that can deal with the new emerging challenges. The third type of behavior, “Travelling with bearings” is when a person projects themselves into an uncertain future that will require a radical shift in the way we organize how people work. The uncertainty is mitigated by a series of essential points that guide HR directors:

- The challenge of adhocratic models. It is impossible to rely on abstract modeling. T-New ways of working must be identified starting from the challenges proper to each specific context.
- The challenge of asynchronous work. In the future, work will be done remotely, and this will require some profound reflection on how to rethink the relational legacy of organizations.

- The challenge of people. People will have a central role to play in identifying new sustainable working conditions. Relying on abstract models or falling under the spell of the old paradigms will not enable us to rise to the challenge of creating innovative modes of working.

## Manager Reflexivity

What emerges from this study is that HR managers reacted in very different ways to the spread of COVID-19 and these differences seem to be connected to the managers' ability to reflect upon the situation in progress. In particular, we make use of the concept described by Cassell et al. (2019) who, emphasizing the benefits of reflective thought, points to people's capacity for meta-thinking as being critical in enabling them to construct a complex representation of the work situation they are experiencing. This ability to face a crisis or emergency by achieving some detachment from the contingent events and expanding their reflective capacity is not evenly spread among managers. Most of our respondents exhausted their reflexive efforts either by resorting to management actions that were focused on surviving in the current situation or by using defense mechanisms that were focused on escaping to the past or projecting into a-historic future, represented by the abstract modeling of theoretical organizational models. Only a small minority of respondents (Traveling the Bermuda Triangle cluster) showed that they were able to activate reflective thought and question their strategies of problem-posing and problem-setting, projecting their managerial action into an uncertain future, in which it will be necessary to promote the involvement of all the people present in the organization to find possible forms of innovation, through widespread participation.

In our opinion, these different positions have a series of implications for how to manage human resources in times of crisis. Approaches such as "Escape to the past..." and "New organizational scenarios" which seem to be able to "tidy things up" and reassure people in a chaotic situation, may end up preventing managers from staying in touch with reality and listening to people and to their experiences, which can vary enormously.

While on the one hand the remaining approaches, "Surviving and support" and "Crossing the Bermuda Triangle," can create uncertainty and conflicts between opposing claims, stances, and modes of experiencing and interpreting the crisis; they seem at the same time to offer managers greater opportunities to have a handle on the situation and the people involved. They can produce truly "alternative" ways of coping with the crisis, creating and strengthening new abilities to learn from experience, to be used not only in the short term but also in the medium and long term.

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It seems to us, then, that this pilot study can offer initial suggestions to managers who are still involved in tackling the crisis generated by the impact of COVID-19. The first suggestion is to listen to people and to remember to bear in mind that different people react to a crisis in different ways. The second recommendation is to devote the right amount of time and space to build (together with the employees) a "framework" of meaning where colleagues can place themselves, to take charge of (and make sense of) the experiences of everyone. This might mean not offering any immediate and univocal answers, nor clear indications, and might also mean listening to conflicting positions and opposing interpretations, which, if they are to be resolved, need to be heard and given some legitimacy.

## Limitations and Indication for Further Research Studies

This research was carried out over a short period, and it was possible to investigate in real-time how HR managers gave meaning to the COVID-19 emergency at the very moment in which Italy was entering lockdown. In light of these conditions, this study was able to consider only a limited sample of subjects and was therefore exploratory, and further investigation is necessary, using a bigger and wider-ranging sample of managers and companies to analyze how they responded to the crisis, the implications of reflexivity, and the social and organizational impact in the medium and long term. Furthermore, follow-up research could also monitor which management strategies are being implemented in the phases after lockdown and the consequences of these approaches.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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# Is Fear of COVID-19 Contagious? The Effects of Emotion Contagion and Social Media Use on Anxiety in Response to the Coronavirus Pandemic

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The novel coronavirus disease (COVID-19) has become a global pandemic, causing substantial anxiety. One potential factor in the spread of anxiety in response to a pandemic threat is emotion contagion, the finding that emotional experiences can be socially spread through conscious and unconscious pathways. Some individuals are more susceptible to social contagion effects and may be more likely to experience anxiety and other mental health symptoms in response to a pandemic threat. Therefore, we studied the relationship between emotion contagion and mental health symptoms during the COVID-19 pandemic. We administered the Emotion Contagion Scale (ESC) along with a measure of anxiety in response to COVID-19 (modified from a previous scale designed to quantify fear of the Swine Flu outbreak) and secondary outcome measures of depression, anxiety, stress, and obsessive-compulsive disorder (OCD) symptoms. These measures were completed by a large ( $n = 603$ ) student sample in the United States. Data were collected in the months of April and May of 2020 when the fear of COVID-19 was widespread. Results revealed that greater susceptibility to emotion contagion was associated with greater concern about the spread of COVID-19, more depression, anxiety, stress, and OCD symptoms. Consumption of media about COVID-19 also predicted anxiety about COVID-19, though results were not moderated by emotion contagion. However, emotion contagion did moderate the relationship between COVID-19-related media consumption and elevated OCD symptoms. Although limited by a cross-sectional design that precludes causal inferences, the present results highlight the need for study of how illness fears may be transmitted socially during a pandemic.

**Keywords:** pandemic (COVID-19), media effect, anxiety, COVID-19, emotion contagion

## INTRODUCTION

The novel coronavirus disease (COVID-19) is a viral respiratory infection that was identified in Wuhan, China in late 2019. COVID-19 was officially declared a pandemic on 11 March 2020 (World Health Organization, 2020) and has spread rapidly across the globe. The United States recently reached a grim milestone of 200,000 COVID-19-related deaths (CDC, 2020). COVID-19 has had a severe impact on healthcare systems, economic activity, and has caused widespread social disruption. The effects of COVID-19 on mental health and emotional well-being are likely to be enormous as well. A recent survey by the U.S. Census Bureau found that one-third of Americans are showing signs of clinical anxiety or depression related to COVID-19 (National Center for Health Statistics, 2020).

It is critical to study the factors that relate to impaired mental health and emotional symptoms in response to COVID-19 to understand how the public responds to pandemic illness threats. Existing research has investigated factors related to mental health symptoms in response to illness threats such as the H1N1 “Swine Flu” influenza (Tausczik et al., 2012; Wheaton et al., 2012), Zika virus (Blakey and Abramowitz, 2017), SARS (Xie et al., 2011), and Ebola (Blakey et al., 2015; Thompson et al., 2017). This work has largely suggested that pandemic illness threats are associated with widespread anxiety and worry among the public. Importantly, anxiety about one’s health can be helpful and adaptive in moderation, as it can focus attention and promote utilization of health-protective behaviors (e.g., handwashing and maintaining social distance). However, for some individuals, anxiety in response to a pandemic threat can become excessive and maladaptive (Asmundson and Taylor, 2020). Excessive anxiety can be debilitating and lead to severe impairment in functioning. In addition, some individuals may develop excessive behavioral responses to prevent infection. For example, past work (Brand et al., 2013) has linked anxiety about pandemic illnesses to extensive washing and cleaning compulsions, which are hallmark symptoms of obsessive-compulsive disorder (OCD), a psychiatric disorder that can be disabling when severe (American Psychiatric Association, 2013).

Research suggests that fear about an illness and associated behavioral changes can also spread virally (Asmundson and Taylor, 2020). For example, media reports about serious contagious illnesses can lead to threat-based reactions as has been shown historically, including in reports that link mass panic about the 1665 London plague to newspaper articles, prompting officials to shut down printing presses (Defoe, 2016). Similarly, consumption of media reports about more recent pandemic illness outbreaks has also been associated with anxiety symptoms (Xie et al., 2011; Tausczik et al., 2012). The mechanisms by which media reports lead to anxiety and other emotional reactions to a pandemic require further study. In particular, work is needed to determine which factors predispose certain individuals to experience these symptoms. One potential factor that has not received sufficient empirical attention is the construct of emotion contagion.

Emotion contagion, a construct from the field of social psychology, refers to the well-established finding that the emotion and affective behavior experienced by one individual may be influenced by that of others through conscious or unconscious pathways (Hatfield et al., 1993). For example, seeing other people cry at a funeral may provoke sadness and tearfulness in oneself. A large body of work in the field of social psychology supports the social transmission of emotion in laboratory experiments (Hatfield et al., 2014). Recent experimental work also suggests that emotional states can be transferred to others via social media (Kramer et al., 2014). Susceptibility to emotion contagion has been investigated as an individual difference variable, as some are more likely to take on social emotions than others. Evidence to support the notion that individuals differ in their tendency to be influenced by the emotions expressed by other people comes from data showing large individual differences in self-reported emotional contagion (Doherty, 1997; Sonnby-Borgström, 2002). In addition, self-reported susceptibility to emotion contagion has been linked to brain areas in the mirror neuron system for emotions (Lawrence et al., 2006; Pfeifer et al., 2007) as well as the ability to detect authentic facial emotions (Manera et al., 2013).

Several forms of emotions appear to be socially contagious, including happiness, anger, and anxiety (Behnke et al., 1994). However, data suggest that negative emotions are particularly transmissible among strangers (Paukert et al., 2008). Recent empirical work shows that individuals higher in emotion contagion have more stress reactivity in response to traumatic events (Trautmann et al., 2018). Thus, it is possible that people who are more in tune with the pervasive emotions of others may be particularly affected during the COVID-19 outbreak.

Whereas the majority of work on emotion contagion has focused on personal interactions, recent work has determined that emotions can be transmitted digitally (Coviello et al., 2014; Goldenberg and Gross, 2020). This is particularly important given that social media is ubiquitous in the present moment and many adults get their news through social media. As the virus has spread across the world, it has garnered significant media attention. Based on past research, this media exposure is likely to increase anxiety about COVID-19, but this effect might be especially strong for individuals higher in susceptibility to emotion contagion.

The present study sought to investigate the relationship between susceptibility to emotion contagion, media usage, and emotional responses to the COVID-19 outbreak in a large sample of adult residents of the United States during the early phase of the illness threat. We explored the novel hypothesis that individuals higher in emotion contagion would have heightened concerns about COVID-19 as well as more other mental health symptoms (anxiety, depression, stress, and OCD symptoms). Given that consumption of media about COVID-19 and utilization of social media may also heighten anxiety about the virus, we conducted a regression analysis controlling for these factors. Finally, we tested the possibility that emotion contagion might potentiate the relationship between media use and concern about COVID-19 via moderation analysis. As a secondary set of outcomes, we also evaluated other mental health variables including symptoms of depression, anxiety, stress, and OCD.

## MATERIALS AND METHODS

### Participants

Participants ( $n = 603$ ) were recruited from psychology classes at Florida International University (FIU) and were English-speaking residents of the United States. There were no other inclusion/exclusion criteria. The total sample consisted of 528 females (87.6%) and 71 males (11.8%). Three individuals (0.5%) selected “prefer not to say” when asked about gender identity and one respondent (0.2%) left the question blank. The sample had a mean age of 22.92 years ( $SD = 4.83$ , range 18–48). Race-ethnicity was assessed via two separate questions. On the first question, participants were asked to check a box to identify with a race: 63.0% selected “White/Caucasian,” 17.6% selected “Black/African American,” 4.1% selected “Asian/Pacific Islander,” 14.3% selected “other,” and 1.0% left the question blank. On a separate question, participants were asked “are you of Hispanic/Latino descent” and 74.3% selected yes.

### Procedure

Data were collected from 5 April to 13 May 2020, which comprised some of the early months of the COVID-19 outbreak in the United States. The FIU student sample was recruited from psychology classes and completed the survey in exchange for course credit. Data were collected via an online survey that was built using the online survey tool, Qualtrics. The first page of the survey comprised the study consent form. On the following pages, participants completed the set of self-report questionnaires listed below (in a fixed order), as well as a series of demographic questions. The study was reviewed and approved by the institutional review board (IRB).

### Measures

#### Emotion Contagion Scale (ECS; Doherty, 1997)

The ECS is a 15-item self-report scale that assesses the tendency to “catch” the emotions expressed by others. Items on the ECS assess susceptibility to the social transmission of five basic emotions: anger, fear, sadness, happiness, and love. Items are scored on five-point Likert scales from *not at all* (1) to *always* (5). The ECS has good psychometric properties and is commonly used in research studies. In the current study, the item stems for certain items on the scale were modified to include examples of how emotions could be transmitted online (e.g., “I cry at sad videos on social media”). In the present sample, the scale had good internal consistency ( $\alpha = 0.88$ ).

#### COVID Threat Scale (CTS)

The COVID-19-threat Scale is a nine-item, self-report inventory that was created for the present study by adapting a questionnaire developed to assess anxiety in response to the H1N1 “Swine Flu” influenza (Brand et al., 2013). Items utilize a five-point Likert Scale from *not at all* (1) to *very much* (5) to assess threat-perceptions of COVID-19. Items assess threat-related perceptions about the extent to which COVID-19 may spread across the United States, concerns about becoming ill or family members becoming ill, and changes in behavior (e.g., excessive handwashing). A tenth item assessing perception that COVID-19

would become a pandemic was not analyzed because COVID-19 was officially declared a pandemic by the WHO. The full scale appears in the **appendix** and analysis of the factor structure of the scale appears in the data supplement. Higher scores reflect greater anxiety and threat-related behaviors in response to COVID-19. The scale had acceptable internal consistency in this sample ( $\alpha = 0.76$ ).

#### Depression Anxiety Stress Scales 21 (DASS-21; Antony et al., 1998)

The DASS-21 is a short form of the original 42-item DASS (Lovibond and Lovibond, 1995). The scale is comprised of three separate subscales, measuring self-reported depression, anxiety, and stress on a 0–4 point scale. The DASS-21 subscales have strong evidence of reliability and construct validity (Henry and Crawford, 2005). The three subscales of the DASS demonstrated good internal consistency in the present study (range in  $\alpha$ 's = 0.85–0.90).

#### Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002)

The OCI-R is an 18-item self-report questionnaire that assesses six dimensions of OCD symptoms: (a) washing, (b) checking/doubting, (c) obsessing, (d) neutralizing, (e) ordering, and (f) hoarding. Participants rate the degree to which they are bothered or distressed by OCD symptoms in the past month on a five-point scale from *not at all* (0) to *extremely* (4). OCI-R total scores have demonstrated excellent psychometric properties and validity (Foa et al., 2002). Reliability in the present sample was excellent ( $\alpha = 0.92$ ). Reliability for the OCI-R subscales was as follows: hoarding = 0.84, checking = 0.68, ordering = 0.87, ordering = 0.78, washing = 0.79, and obsessing = 0.84.

#### Social Media Utilization

For the purposes of the present study, participants were asked a simple question “How much time per day you spend on social media?” on a six-point ordinal response scale. Categories were scored as *not at all* (1), *a few minutes* (2), *about an hour* (3), *between 1 and 3 h* (4), *between 3 and 8 h* (5), *more than 8 h* (6). Similarly, participants were asked “How much time per day do you spend reading, watching or listening to news about the coronavirus?” which was answered on the same time per day response scale. The time frame for these questions was “recently” (i.e., “within the past week”).

#### Statistical Analysis

We first computed correlation coefficients among the study measures to assess the relationship between emotion contagion, media use, and the primary (concerns about COVID-19) and secondary outcomes (anxiety, depression, stress, and OCD symptoms). Next, we tested the hypothesis that emotion contagion would predict the degree of fear of COVID-19 controlling for exposure to COVID-19 media and social media utilization. To do this, we entered the ECS scores, social media consumption (per day), and COVID-19-media consumption as predictor variables in a simultaneous regression predicting concern about COVID-19, as indexed by CTS scores. Finally, we

tested the possibility that emotion contagion might potentiate the relationship between media use and concern about COVID-19 via moderation analysis conducted through the PROCESS SPSS macro (Preacher and Hayes, 2008). Subsequent supplementary analyses similarly tested for moderation effects among the secondary outcomes (anxiety, depression, stress, and OCD symptoms). Finally, as a sensitivity analysis, we tested both whether scores on study measures differed by study enrollment time period via independent samples *t*-tests and whether enrollment period affected primary regression results. Statistical analyses were run using the IBM SPSS (Version 23, Armonk, NY, United States).

## RESULTS

### Correlations

**Table 1** presents the correlations among study measures. As shown in the table, greater susceptibility to emotion contagion was significant and positively correlated with concern about COVID-19 ( $r = 0.32, p < 0.001$ ), depression ( $r = 0.12, p < 0.01$ ), anxiety ( $r = 0.27, p < 0.001$ ), stress ( $r = 0.29, p < 0.001$ ), and OCD symptoms ( $r = 0.29, p < 0.001$ ). Emotion contagion susceptibility was weakly yet significantly correlated with daily social media consumption ( $r = 0.13, p < 0.01$ ) and consumption of media related to COVID-19 ( $r = 0.12, p < 0.01$ ). Similarly, concern about COVID-19 was also weakly yet significantly correlated with hours per day of self-reported daily social media consumption ( $r = 0.11, p < 0.01$ ) and consumption of media related to COVID-19 ( $r = 0.21, p < 0.001$ ).

### Regression Results

COVID Threat Scale scores were slightly negatively skewed ( $-0.75$ ) and leptokurtic ( $0.87$ ) but did not violate normality assumptions for regression analysis (skew and kurtosis  $< 1$ ). Regression diagnostics indicated no problems with multicollinearity; the data met the assumption of independent errors (Durbin-Watson value = 2.05) and the histogram of standardized residuals indicated that the data contained approximately normally distributed errors, as did the normal P-P plot of standardized residuals. The data also met the assumptions of homogeneity of variance and linearity.

Results showed that the overall model (which included gender, time per day using social media, consumption of COVID-19 articles, and ECS scores) accounted for 14% of the variance in concerns about COVID-19, which was significant ( $R^2 = 0.14, p < 0.001$ ). Inspection of the individual regression coefficients revealed that the ECS was a significant individual predictor of concerns about COVID-19 [ $b = 0.14 (SE = 0.02), p < 0.001$ ], as was time per day consuming articles about COVID-19 [ $b = 0.83 (SE = 0.20), p < 0.001$ ]. Time per day using social media was not a significant predictor in the model [ $b = 0.17 (SE = 0.19), p = 0.37$ ], nor was participant gender [ $b = 0.50 (SE = 0.63), p = 0.43$ ].

### Moderation Effects

We explored the possibility that emotion contagion might moderate the relationship between excessive concern about

COVID-19 and both general social media utilization and COVID-19-related media consumption. Separate analyses were run considering the two media utilization questions as independent variables.

In the first regression model, concern about COVID-19 (CTS scores) was set as the dependent variable, daily consumption of media pertaining to COVID-19 was set as the independent variable, and emotion contagion was set as the moderator. Results found significant main effects for emotion contagion [ $b = 0.86 (SE = 0.19), p < 0.001$ ] and COVID-19-related media consumption [ $b = 0.14 (SE = 0.02), p < 0.001$ ] but the interaction term was not significant [ $b = -0.01 (SE = 0.02), p = 0.51$ ].

In the second regression model, concern about COVID-19 (CTS scores) was set as the dependent variable, daily utilization of social media was set as the independent variable, and emotion contagion was set as the moderator. Results found significant main effects for emotion contagion [ $b = 0.15 (SE = 0.02), p < 0.001$ ]. The main effect for daily use of social media was not significant [ $b = 0.30 (SE = 0.19), p = 0.13$ ] and the interaction term was not significant [ $b = -0.002 (SE = 0.02), p = 0.88$ ].

### Supplementary Analyses

As a secondary analysis, we explored predictors of the other mental health outcome variables (DASS-21 subscales and OCI-R scores). These analyses are presented in full in the **Supplementary Material**. Overall results showed that emotion contagion was an independent predictor of each of the DASS-21 subscales and of OCI-R scores. Daily consumption of information related to COVID-19 also predicted all secondary outcomes, while daily time on social media predicted DASS-21 Depression and DASS-21 Stress but not OCI-R or DASS-21 Anxiety. There was only one significant moderator: ECS scores moderated the relationship between consumption of COVID-19 information and OCI-R scores such that the strength of this association increased along with increasing ECS scores (see **Figure 1**). Analysis of OCI-R subscale scores revealed that emotion contagion predicted each of the OCI-R subscales. Moreover, ECS scores moderated the connection between consumption of COVID-19 media and four OCI-R subscales (washing, checking, neutralizing, and hoarding), as well as the connection between daily social media use and two OCI-R subscales (obsessing and hoarding) suggesting the emotion contagion may be more relevant for the connection between specific OCD symptoms and media use domains (see **Supplementary Material** for details).

### Analysis by Study Enrollment Period

Given that data collection spanned from 5 April to 13 May 2020, we investigated whether responses varied by date of enrollment. The median response date was 13 April and we divided the participants based on whether they had completed the survey in the first or second half of responses. The two groups of participants (early vs. late responders) did not differ in terms of time per day on social media ( $t = -0.81, p = 0.42$ ), consumption of media about COVID-19 ( $t = -1.04, p = 0.30$ ), or CTS scores ( $t = -0.72, p = 0.47$ ). Regression results predicting CTS scores were similar in both enrollment



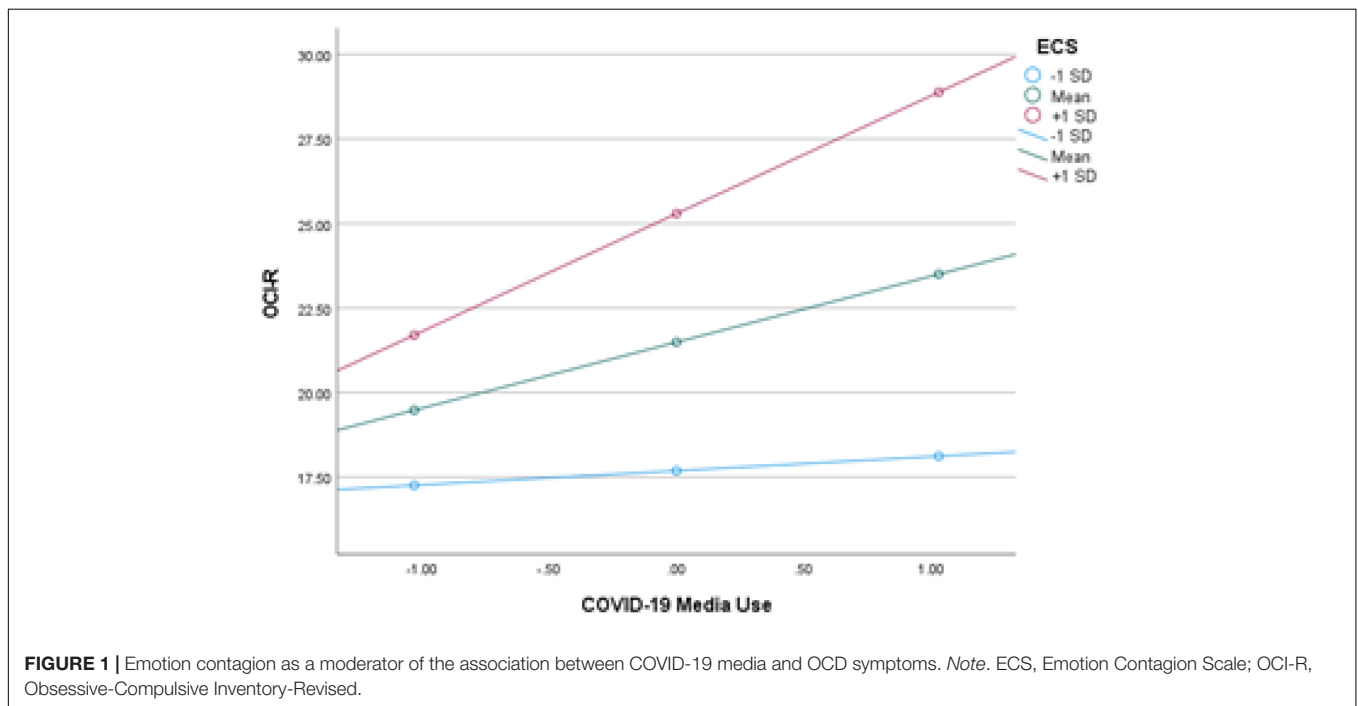
**TABLE 1 |** Correlations among study measures.

	ECS	CTS	DASS-D	DASS-A	DASS-S	OCI-R	Time/day COVID-19	Time/day social media
ECS	–							
CTS	0.32**	–						
DASS-D	0.12*	0.17**	–					
DASS-A	0.27**	0.23**	0.71**	–				
DASS-S	0.29**	0.28**	0.78**	0.79**	–			
OCI-R	0.29**	0.24**	0.53**	0.59**	0.58**	–		
Time/day COVID-19	0.12*	0.21**	0.14*	0.21**	0.17**	0.17**	–	
Time/day social media	0.13*	0.11*	0.14*	0.14*	0.15**	0.12*	0.18**	–

\* $P < 0.01$ .

\*\* $P < 0.001$ .

Note. ECS, Emotion Contagion Scale; CTS, COVID-19 Threat Scale; DASS, Depression Anxiety Stress Scale; OCI-R, Obsessive-Compulsive Inventory-Revised.



**FIGURE 1 |** Emotion contagion as a moderator of the association between COVID-19 media and OCD symptoms. Note. ECS, Emotion Contagion Scale; OCI-R, Obsessive-Compulsive Inventory-Revised.

periods (see **Supplementary Material**). These results suggest that concerns about COVID-19 were stable during the study period, and may have become widespread even before data collection began. Similarly, scores on the DASS-21 subscales and OCI-R did not differ by enrollment period (all  $p$ 's > 0.26).

## DISCUSSION

We investigated emotional responses during the COVID-19 pandemic outbreak in the United States in a large student sample and tested the possibility that individuals with greater susceptibility to emotion contagion would experience more distress and symptomatic behavior. Results were in line with our hypothesis: individuals with greater levels of susceptibility to emotion contagion had greater levels of anxiety about COVID-19, more depression, anxiety, and stress, and

greater levels of OCD symptoms. These findings are discussed in detail below.

Although the magnitude of the associations was modest, our overall findings suggested that individual differences in susceptibility to emotion contagion tracked with emotional symptoms, such as anxiety about the virus and maladaptive behavioral responses (i.e., OCD symptoms). This finding is in line with past work showing that individuals higher in emotion contagion experience more stress responses to traumatic events (Trautmann et al., 2018). In this case, the COVID-19 outbreak itself represents a form of community stressor, causing widespread anxiety and worry in the public. Those high in emotion contagion are likely more attuned to the emotional experiences of others and thereby experience heightened anxiety.

We also considered the possibility that general social media use and consumption of media about COVID-19 in particular would also be relevant to predicting degree of anxiety

around COVID-19. Furthermore, we considered that emotion contagion might act as a moderator for these relationships. Results showed that consumption of media about COVID-19 significantly predicted degree of COVID-19-related anxiety but this relationship was not moderated by emotion contagion. One prior report found that degree of emotion contagion moderated stress response following exposure to a traumatic film but this took place under laboratory conditions and with a highly controlled stressor (Trautmann et al., 2018), whereas our measure of exposure to media on COVID-19 was retrospective and uncontrolled. Therefore, it is possible that under more controlled conditions, a significant moderation effect would have emerged.

Alternatively, it is possible that the link between emotion contagion and fear of a pandemic is independent of exposure to media articles, as other pathways may connect these variables (e.g., information provided via family and friends). Nevertheless, our results linked both media consumption and emotion contagion to concern about COVID-19. This result is in line with research on past pandemics, which found positive associations between consuming media reports about the outbreak and anxiety (Xie et al., 2011; Tausczik et al., 2012). We also found that susceptibility to emotion contagion was related to concern about the spread of COVID-19, as well as other mental health outcomes (depression, anxiety, stress, and OCD symptoms). Emotion contagion was somewhat more strongly associated with concern about COVID-19, anxiety, and stress, and less strongly linked with depression, which may relate to anxiety being the predominant emotion experienced by the public during this time (National Center for Health Statistics, 2020).

In our supplemental analysis, we did find that the link between consumption of media about COVID-19 and OCD symptoms was significantly moderated by emotion contagion such that this association was stronger for individuals higher in emotion contagion. To the extent that OCD symptoms (e.g., compulsive washing and cleaning) might relate to the virus that causes COVID-19, it is possible that proneness to socially transmitted emotions enhanced the link between consumption of alarming articles about COVID-19 and increased OCD symptoms. However, caution is warranted in interpreting this finding because it was conducted as a secondary analysis and the cross-sectional nature of the data preclude drawing causal inferences. In addition, our sample was non-clinical, and therefore, future research is needed in clinical populations.

Hours per day of social media use weakly yet significantly related to concern about COVID-19, but this relationship did not reach significance in our regression model controlling for gender and consumption of COVID-19 related media. Among the secondary outcomes, time interacting with social media did predict symptoms of depression and stress, but not anxiety or OCD symptoms. Emotion contagion did not moderate the link between social media use and the mental health outcome variables. This result suggests that simply using social media may not robustly be linked with all mental health outcomes during a pandemic threat. Rather it may be important to consider the content of social media with which one interacts. Emerging work has suggested that the mental health effects of social media use may be highly variable, with some forms of social media use

linked to deleterious mental health outcomes, while other social media use (e.g., that which encourages belongingness and social connection) may improve mental health outcomes (Clark et al., 2018). Thus, future research with more fine-grained analysis of social media utilization is needed.

## LIMITATIONS

Present results should be interpreted in light of several important study limitations. First, all data were collected online utilizing a cross-sectional design in which participants completed measures at a single time point. Thus, our results are not able to firmly establish cause and effect relationships. For example, we cannot determine whether media exposure increased anxiety or whether individuals with heightened anxiety were more likely to seek information and therefore spent more time engaging with media. A more powerful design would be a longitudinal study to follow individuals low and high in emotion contagion to compare their utilization of social media and trajectories for anxiety and stress in response to a pandemic threat. Similarly, other variables (such as neuroticism) should be considered as potential third variables explaining the associations between observed relationships. Unfortunately, neuroticism was not assessed in our survey, representing an important future direction for research. In addition, all data were collected via self-report surveys, and reliance on self-report questionnaires may have inflated the relationship between variables due to shared methods variance. Future study using mixed methods approaches including interviews would add methodological diversity to measurement. Finally, the data were limited to a student sample (that was mostly female). Therefore, future research is needed to replicate these findings in other samples, including among clinical samples of individuals experiencing anxiety disorders who may be particularly affected by fears of pandemic illness threats (Dennis et al., 2020), as well as samples with greater numbers of male participants. Given that the results of some of the present analyses were statistically significant but of small magnitude, their clinical significance requires further study.

## CONCLUSION

Notwithstanding these limitations, the present report highlights the possibility that emotion contagion effects may contribute to emotional reactions during a pandemic illness outbreak, such as COVID-19. We found that those who were higher in susceptibility to emotion contagion experienced more concern about the spread of COVID-19, more anxiety, stress, and depression and greater OCD symptoms. Together, these data suggest that maladaptive emotional experiences may be socially contagious during a pandemic threat.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Institutional Review Board at Florida International University. The participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MW and AP conceived of the idea for this study. AP sought and received approval from the local IRB and coordinated data collection. MW and GM conducted the statistical analysis. All authors contributed to the final write up and all reviewed and approved the submission.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## APPENDIX

**TABLE TA1** | Covid-19 Threat Scale (CTS).

	NOT AT ALL	A LITTLE	SOME	MUCH	VERY MUCH
1. To what extent are you concerned about Coronavirus?	1	2	3	4	5
2. How likely is it that you could become infected with Coronavirus?	1	2	3	4	5
3. How likely is it that someone you know could become infected with Coronavirus?	1	2	3	4	5
4. How quickly do you believe contamination from Coronavirus is spreading in the U.S.?	1	2	3	4	5
5. How much exposure have you had to information about Coronavirus?	1	2	3	4	5
6. If you did become infected with Coronavirus, to what extent are you concerned that you will be severely ill?	1	2	3	4	5
7. To what extent has the threat of Coronavirus influenced your decisions to be around people?	1	2	3	4	5
8. To what extent has the threat of Coronavirus influenced your travel plans?	1	2	3	4	5
9. To what extent has the threat of Coronavirus influenced your use of safety behaviors (e.g., wearing a mask in public or using hand sanitizer)?	1	2	3	4	5



# The Role of Attitudes, Affect, and Income in Predicting COVID-19 Behavioral Intentions

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Handwashing is important in preventing infectious diseases like COVID-19. The current public health emergency has required rapid implementation of increased handwashing in the general public; however, rapidly changing health behavior, especially on this scale, is difficult. This study considers attitudes and affective responses to handwashing as possible factors predicting COVID-19 related changes to handwashing behavior, future intentions, and readiness to change during the early stages of the pandemic in the United States. Income was explored as a potential moderator to these relationships. To explore these issues, data from 344 community participants were analyzed. Results indicate that stronger affective responses toward handwashing relate to increases in handwashing since the outbreak of COVID-19, and both attitudes and affect uniquely predict handwashing intentions. Income significantly moderated the relationship between affect and readiness to change. Those with low income were more influenced by both affective responses and attitudes. These results suggest messages targeting both cognitions and affective responses are needed to increase the handwashing behavior during a global pandemic and these variables are critical in increasing readiness to change in low-income individuals.

**Keywords:** COVID-19, behavioral intentions, handwashing, readiness to change, affective responses, emotion, attitudes

## INTRODUCTION

Due to the rapid spread of the SARS-CoV-2 virus, it was critical that Americans quickly implemented health behaviors such as social distancing and frequent handwashing. This implementation is, perhaps, easier said than done, as rapid implementation of behavior change is notoriously difficult to achieve in many health domains. With the backdrop of a global pandemic, it was unclear how Americans would response to this need for behavior change, or what factors may be influential. Handwashing was not only among the first behaviors recommended to the public, remaining visible to the public throughout the course of the pandemic, but it is also central to the prevention of the spread of SARS-CoV-2 (West et al., 2020). As such, it is logical to explore it as a target behavior. The present study builds on emerging literature (Williams et al., 2018) and hypothesizes that affective and cognitive variables are critical and distinct predictors of behavior, behavioral intentions, and readiness for behavior change. Further, as disparities have been seen in the potential risk to those who have lower

incomes (Koma et al., 2020; Raifman and Raifman, 2020), income will be explored as a potential moderator.

Factors related to behavioral intentions and change have been widely explored, however the rapidity of the change due to the pandemic in the United States is unprecedented, and it is unclear what factors will be most influential on behavior and intentions. Cognitive variables, such as attitudes, have long been established as consistent predictors of behavioral intentions in models such as the Theory of Planned Behavior (Ajzen, 1991), and attitudes have previously been found to significantly predict prevention-related behavioral intentions related to the Ebola epidemic (Gamma et al., 2017). Determining behavioral intentions, however, may give an incomplete picture of actual behavior. Readiness to make behavioral changes may help to fill this gap, as it has also been found to be uniquely predictive of the actual behavior in other domains (Biller et al., 2000; Geller et al., 2004). Attitudes have also been found to predict individuals' temporal readiness to change, or stage of change (Ronda et al., 2001). The present study seeks to confirm that attitudes continue to predict behavior, intentions, and readiness to change during a rapidly moving pandemic with diverse and intense health-related messaging and personal relevance.

Alongside attitudes, affective responses to health behaviors have recently been acknowledged as important predictors of health behaviors (Schuettler and Kiviniemi, 2006; Rhodes et al., 2009; Kwan and Bryan, 2010; Ferrer et al., 2016). For example, the Behavioral Affective Association Model (BAAM; Kiviniemi and Klasko-Foster, 2018) contends that affective associations with health behavior are a critical and often underappreciated determinant of action. The BAAM identifies cognitive variables (e.g., perceived norms) and affective variables (e.g., positive feelings) as independent predictors of intentions and health behaviors (e.g., Brown-Kramer and Kiviniemi, 2015). In line with such models, studies indicate that affective variables can be separate predictors of health actions and intentions from cognitive variables, such as attitudes (Lowe et al., 2002; Kiviniemi et al., 2007; Conner et al., 2013; Geers et al., 2017). For example, using simultaneous regression analyses, Lawton et al. (2009) found that affective and instrumental attitudes were separate significant predictors of intentions to perform 11 different health behaviors, including alcohol consumption, flossing, and sunscreen use. Similarly, Murray et al. (2019) recently found that affective associations with physical activity and perceived barriers to physical activity were separate and simultaneous predictors of physical activity in cancer survivors. Interestingly, in these studies, the affect variables were generally a stronger predictor of health intentions and behavior than the cognitive variables. It now appears that behavior change interventions can be optimized if they specifically target changing emotions as well as attitudes (for a review, see Williams et al., 2018). Based on this emerging database, it is predicted in the present study that affective responses to handwashing will be distinctly predictive of behavior and intentions. While there is little evidence to date on the impact of affective responses on the stages of change, affect is inherently tied to the processes of change (e.g., dramatic relief; Prochaska et al., 2008), and thus it is also predicted that affective response will be uniquely

predictive of readiness to change handwashing behavior during the early stages of a global pandemic.

While attitudes and affect are expected to drive handwashing behavior, intentions, and readiness to change, it is possible that the influence of these predictors varies with important social factors. One possibility, explored here, is that income moderates these effects. It is well documented that income and factors related to income are determinants of health (USDDS, 2020). Emerging data suggests that monetarily impoverished communities are most impacted by COVID-19. A recent analysis of the Behavioral Risk Factor Surveillance System data by Koma et al. (2020) from the Centers for Disease Control and Prevention (CDC) revealed that lower income was associated with more risk factors for becoming seriously ill with COVID-19 in the United States (also see Raifman and Raifman, 2020). In addition to low-income being associated with risk factors related to COVID-19 such as diabetes (Bird et al., 2015), chronic kidney disease (Nicholas et al., 2015), and heart disease (Lemstra et al., 2015), low income may also increase risk due to behavior. Those living in low-income areas have been found to be less likely to follow stay home directives (Chiou and Tucker, 2020), perhaps due to the lack of time off, job requirements, or being unable to forego income. Furthermore, income plays a particularly strong role in perceptions of information about healthy behaviors in the United States: Those with high income are more positive about their health and health care than those with low income (Hero et al., 2017). As low income can relate to riskier behavior and less responsiveness to health care information, positive changes in affective responses and attitudes for these individuals may result in greater benefits. Understanding the impact of income on the processes behind key health behaviors would shed light on psychological factors involved in the different paths of low- and high-income individuals and may highlight directions for more targeted intervention. As such, income will be explored as a moderator of the relationship between both attitudes and affect and the dependent variables of handwashing behavior, intentions, and readiness to change. It should be noted that there is some overlap in the data presented in the current study and a paper by Matkovic et al. (2020), including demographic items, handwashing attitudes, affect, intentions, and readiness to change. However, while the study by Matkovic and colleagues focused on differences in variables in response to a message intervention manipulation, this study focused on modeling the relationships among variables including attitudes, affect, and intentions, in order to better understand the pathways these variables take in affecting behavior. While there is an overlap in the data used, separate *a priori* hypotheses were made and separate analyses were run for each study.

## MATERIALS AND METHODS

### Participants

Community participants ( $N = 344$ ) were recruited from Prolific, an online participant recruitment system at the end of March 2020, just as stay home and shelter in place orders began to

be issued in many states. Participants ranged in age from 18 to 74 ( $M = 32.69$ ,  $SD = 11.60$ ), and were fairly evenly distributed by gender, with 54.1% identifying as women, 43.9% identifying as men, and 1.5% identifying as another gender or preferring not to disclose their gender. Participants lived in the United States at the time of survey completion and represented 44 of the states. Participants were 68% White, 16% Asian/Asian-American, 5% Black, 5% Latinx, and 6% two or more races. Participants were compensated for participating in the study.

## Measures

Participants completed measures through the Qualtrics survey platform and provided information about their handwashing attitudes, affective responses, intentions, and readiness to change.

### Demographic Items

Demographic items, including age, gender, race and ethnicity, and household income, were included at the end of the study. A series of items relating to geographic location, cases of COVID-19 occurring in near proximity, and risk factors related to COVID-19 were also collected at this time. Of interest in the present study, household income was collected as a multiple-choice item in which participants indicated their household income in \$9,999 increments. Eleven options were provided, with the final choice indicating "\$100,000 or more." Of the respondents, 52.6% fell in the income range of \$20,000 and \$79,999, and 19.80% reported household incomes \$100,000 or more.

### Handwashing Attitudes

Handwashing attitudes were assessed using two items presented on a 7-point Likert scale ranging from *strongly agree* to *strongly disagree*. The items asked participants to rate how important and effective handwashing is in preventing disease, reading "Handwashing is effective in preventing disease" and "Handwashing is important." The two items showed acceptable internal consistency with a Spearman-Brown coefficient of 0.78, and were averaged together to create a single bipolar attitude toward handwashing measure, ranging from negative to positive.

### Handwashing Affect

Five items that assessed affective responses related to handwashing were measured in order to capture the strength of these affective responses. Items included both positively and negatively valenced affective states, including anger, pride, guilt, annoyance, and feeling in control. Example items include "I am angry when others do not wash their hands" and "I am proud of washing my hands." Items were scored on a 7-point Likert scale ranging from *strongly disagree* to *strongly agree*. The five items had a high level of internal consistency ( $\alpha = 0.83$ ). As such, the five items were averaged together to create a single bipolar affect toward handwashing measure.

### COVID-19 Handwashing Behavior Change

COVID-19 related handwashing behavior change was calculated by asking participants to self-report the number to times they

washed their hands daily before the outbreak of COVID-19 and then after the outbreak of COVID-19. Both items allowed participants to enter a numeric response into an open response item. Analyses were conducted on the post-COVID-19 handwashing behavior while controlling for self-reported pre-COVID-19 handwashing behavior.

### Handwashing Intentions

Handwashing intentions were assessed using six questions that targeted the intention to wash one's hands in scenarios recommended by health organizations, such as "after blowing your nose, coughing or sneezing" and "after touching surfaces outside of the home, including money." The final item asked about intention to wash one's hands for at least 20 s each time. The scale demonstrated a high level of internal consistency ( $\alpha = 0.80$ ).

### Readiness to Change

Temporal readiness to change, or the stage of change that a participant is in, was simply assessed with a single item modeled after the work of Glanz et al. (1994). Participants were asked to select an option that best reflected their intention to wash their hands for 20 s multiple times per day. Response options included "I do not intend to do this," "I have thought about doing this, but do not yet plan to," "I intend to do this, but have not done it yet," "I am actively doing this," and "This is something that I have done for a long time, and intend to continue doing to prevent disease."

## Procedure

The present study was conducted as part of a larger project on COVID-19 and was approved by the University of Toledo Institutional Review Board. All procedures were conducted in compliance with the guidelines of the American Psychological Association. Participants were eligible for inclusion if they were at least 18 years old and resided in the United States. Before responding to the measures used in the present study, participants first were shown one of five brief handwashing messages for other purposes. The dependent variables in the present study, COVID-19 related handwashing behavior change, and readiness to change, did not differ based on the message shown. Only handwashing intentions were impacted by this message manipulation, and specifically, only one group differed from the other four. This group was excluded from the analysis of behavioral intentions to ensure that the message manipulation did not impact the present findings. It should be noted that the analyses produce similar results when they are conducted with all participants by controlling for message condition. Participants then completed the previously described measures on their attitudes, affect, intentions, and readiness to change related to handwashing. Finally, participants concluded their participation by completing demographic items.

## RESULTS

**Table 1** provides the means, standard deviations, and bivariate correlations for the measures of handwashing attitudes, affect,



intentions, behavior, and readiness to change. Notably, affect and attitudes were both positively correlated with COVID-19 related change in handwashing behavior, intentions, and readiness to change.

Given the correlations between variables, relative weights analyses (RWA; Johnson, 2000; Tonidandel et al., 2009) were used to determine the relative importance of attitudes and affect in explaining their relationship with the dependent variables of behavior change, behavioral intentions, and readiness to change. In RWA, predictor variables are transformed into orthogonal variables that are maximally related to the original predictors to determine the amount each predictor contributes to the total predicted variance and considers a predictor's direct effect (Johnson and LeBreton, 2004). The results from each analysis is described below and a summary of the findings can be found in Table 2.

### COVID-19 Handwashing Behavior Change

Changes in the number of times per day participants washed their hands before and after knowledge of COVID-19 was first assessed. Both the pre- and post-COVID-19 handwashing variables displayed considerable positive skew. As such, a natural log transformation was applied to both variables. Analyses were run both pre- and post-transformation. Both results were significant and produced similar findings. The transformed

variable was used in the presented analyses. In an RWA, when controlling for handwashing behavior prior to COVID-19, affect, but not attitudes was found to be a significant predictor of COVID-19-related handwashing behaviors.

### Handwashing Behavioral Intentions

Mirroring the first RWA, analyses were also run with behavioral intentions as the outcome variable. The results suggest that handwashing attitudes and affect are distinct significant predictors of handwashing intentions, with affect emerging as the stronger of the two predictors.

### Readiness to Change

Again, similar to the previous analyses, an RWA was used to determine the relationship between handwashing attitudes, affect, and readiness to change. The RWA indicated that, similar to handwashing behavior, only affect was a significant predictor of readiness to change.

### Income

Next, moderation analyses were conducted using the PROCESS macro for SPSS (Hayes, 2017) to determine if income moderated the relationship between attitudes and affect, and handwashing behaviors, intentions, and readiness to change. Analyses revealed

TABLE 1 | Means, standard deviations, and correlations of the variables.

	N	M	SD	1	2	3	4	5	6
1. Attitudes	344	6.67	0.50	-					
2. Affective responses	344	5.47	1.07	0.39***					
3. Previous handwashing	343	6.43	6.77	0.04	0.23***				
4. Current handwashing	343	10.93	8.35	0.13**	0.30***	0.79***			
5. Intentions	276	4.40	0.62	0.41***	0.48***	0.21***	0.30***		
6. Readiness to change	341	4.25	0.77	0.22***	0.33***	0.25***	0.25***	0.47***	
7. Income	342	6.44	3.30	-0.01	-0.01	0.01	0.05	-0.01	0.02

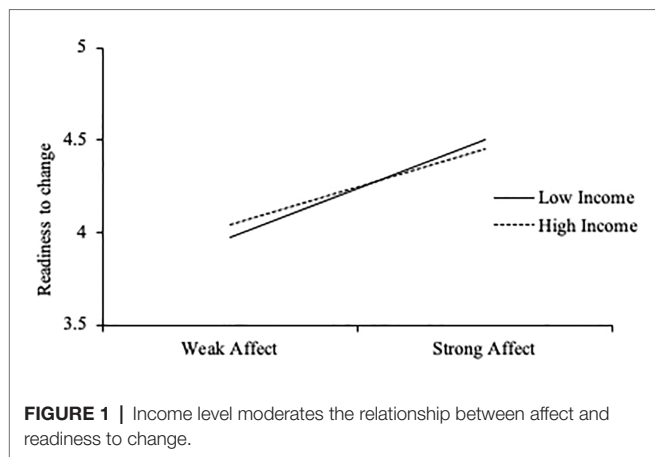
\*\*p < 0.01; \*\*\*p < 0.001. The means and standard deviations of the handwashing behavior variables represent the raw, untransformed variables.

TABLE 2 | Relative weights analysis examining the association of attitudes and affect with handwashing behavior, intentions, and readiness to change.

Variable	b	β	RW	CI-L	CI-U	RS-RW	R <sup>2</sup>
<b>Handwashing in response to COVID-19</b>							
Handwashing attitudes	0.10	0.08	0.011	-0.002	0.035	1.663	
Handwashing affect*	0.05	0.08	0.041	0.013	0.080	6.356	
Prior handwashing*	0.72	0.77	0.589	0.505	0.661	91.982	
<b>Behavioral intentions</b>							
Handwashing attitudes*	0.31	0.27	0.114	0.036	0.194	38.320	
Handwashing affect*	0.22	0.39	0.184	0.086	0.278	61.680	
<b>Readiness to change</b>							
Handwashing attitudes	0.18	0.11	0.031	-0.001	0.078	25.795	
Handwashing affect*	0.21	0.28	0.088	0.028	0.170	74.205	

\*indicates statistical significance determined by 95% CI.

b and β represent unstandardized and standardized regression coefficients, respectively; RW, raw relative weight; CI-L, lower bound of confidence interval used to test significance of RW; CI-U, upper bound of confidence interval used to test RW; RS-RW, rescaled relative weight shown as the percent of predicted variance in the outcome variable attributed to each predictor variable. Handwashing behavior n = 342; Behavioral intentions n = 277; readiness to change n = 344.



income to be a significant moderator ( $b = -0.03$ ,  $SE = 0.01$ ,  $p = 0.006$ ) of the relationship between affect and readiness to change,  $F(3, 335) = 7.71$ ,  $p < 0.001$ ,  $R^2_{\text{change}} = 0.02$ . Specifically, stronger affective responses resulted in greater readiness to change for low-income Americans, but not high-income Americans (see **Figure 1**). Income did not moderate the effects on behavioral intentions or handwashing behavior.

## DISCUSSION

The COVID-19 pandemic is the first of its kind occurring in modern times. As such there is limited data available to understand and make sense of the way that individuals respond to and react during a time of disease-related crisis. Gaining an understanding of public behavior provides the opportunity to better intervene at the preventative level, allowing for proven biomedical and epidemiological strategies to be more widely utilized and adopted. Behavioral research focused on COVID-19 is therefore critical in order to empower governments and health care organizations to intervene in the current pandemic and prepare for future events.

The present study begins to disentangle the relationships between both cognitive and affective variables on key health behaviors at an early stage of a rapid public health crisis. The RWAs considering the relative weights of attitudes and affect in predicting COVID-19 handwashing and readiness to change revealed handwashing affect to be a relatively stronger predictor of actual handwashing than handwashing attitudes. This advantage of affect over attitudes was more pronounced on the measure of readiness to change handwashing behavior. These findings add to emerging affective science database which indicates that cognitive variables, such as attitudes, are typically better predictors of behavioral intentions, and that affective variables are more closely related to the actual behavior (Williams et al., 2018). These findings highlight the importance of considering the affective impact of interventions, as affective variables may be the driving factor behind actual behavior change and readiness to make those changes.

Despite this finding, cognitive variables should not be dismissed. Actionable interventions for behavior change often

necessarily focus on changing participant intentions, which are often directly predictive of behavior. The present study provides evidence for the unique impact of both cognitive and affective variables on behavioral intentions in the context of a pandemic, and highlights the importance of targeting both variables for intervention. As predicted, attitudes toward handwashing were found to be significant predictors of handwashing behavioral intentions. Also, in support of our hypotheses, affective responses were found to better predict handwashing behavioral intentions beyond the impact of attitudes, in that the relative importance of affect was stronger than that of attitudes. This lends support to past studies demonstrating that affective constructs are distinct from cognitive variables, and additionally shows that this is true even during times of increased attention to health due to an abundance of health-related messaging and high personal relevance. Importantly, these data suggest that handwashing interventions should target both attitudes and affect.

Beyond these findings, it was also demonstrated that household income significantly interacted with handwashing affective responses when predicting readiness to change, but not when predicting past behavior change or behavioral intentions. Low-income individuals showed lower readiness to change than high-income individuals when they had weak affective responses; however, their readiness to change was higher than high-income individuals when they had strong affective responses. One possible explanation for this moderation occurring for readiness to change, but not COVID-19 related behavior change or intention, may be that while participants of all income levels display similar intentions to change, temporal readiness to change, as captured in participants' stage of change, may capture forecasts of future internal and external barriers that impede enactment of this intention, and strong affective responses may work to overcome these barriers.

## Limitations and Suggestions for Future Research

The current results should be understood in light of the study's limitations. The present data is cross-sectional and self-reporting in nature. The behavior change variable utilized in the present study was self-report in nature and future research should include other measurements. This variable also addresses past behavior, as opposed to future behavior change, which does not allow for the causal influence of intentions on the behavior to be explored. Relatedly, the measure of attitudes used in the present study was limited to two items due to the need for brevity. While care was taken to use items that would capture participants' attitudes, it is possible that results may be biased by having a more robust, 5-item measure of affect. Relatedly, income was employed as a moderator due to its established connection to health behavior and perceptions, as well as to emerging data that it is a risk factor for becoming seriously ill from COVID-19. Income, however, is an overarching societal-level variable, like age and education, that can be linked to many specific psychological processes. As such, additional work is needed to clarify the important moderating effect derived from income.

Given the promising present results, however, future studies should also aim to determine how other cognitive variables,

such as perceived susceptibility, subjective norms, and perceived control impact handwashing intentions, readiness to change, and behavior.

While the present study determined that income level moderates the relationship between affect and readiness to change, future studies should consider the influence of affect and attitudes as mediators of the demographic predictors of COVID-19 preventative behaviors. Future work should also aim to differentiate the impact of positive and negative affective responses, as differences can manifest in their predictive ability (Geers et al., 2017), and should also consider differences in self-conscious and hedonic affective states. For example, while not a primary focus of this study, both self-conscious and hedonic affective states were included in the measure of affect used here. *Post hoc* exploratory analyses found that these states significantly differed from one another, with hedonic states being rated as stronger. Upon examination, it appears that these types of affect were also distinct predictors of intentions, while only hedonic emotions were predictors of readiness to change. These results are in line with the findings of Giner-Sorolla's (2001) findings that hedonic affect was more accessible than self-conscious affect in situations related to self-control. Since these analyses were *post hoc*, future studies are needed to explore the impact of different types of affective states on health behaviors.

## Conclusion

While extensive research has been devoted to understanding variables related to preventative health behaviors, little is known about how these variables perform in the United States during a pandemic, such as COVID-19. The present results provide initial evidence that cognitive and affective variables are distinct predictors of behavioral intentions and demonstrates the moderating role of household income in predicting readiness to change. This suggests the promise of interventions targeting

both attitudes and affect for increasing handwashing behaviors and suggests that these types of interventions may be particularly efficacious in low-income communities.

## DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: [osf.io/bdx8g](https://osf.io/bdx8g).

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Toledo Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

KC was the lead writer of the original draft, involved in the conceptualization and developing the methodology of the project, and responsible for the collection and formal analysis of the data and visualizing data. JM was involved in the conceptualization of the project and the interpretation of results, and contributed to the original draft and review and editing. KF was involved in the conceptualization and methodology of the project and editing and revision process, aided in the development of project materials, and provided supervision. AG was involved in the supervision, conceptualization, and methodology of the project, aided in the development of project materials and formal data analysis, contributed to the original draft, and provided editing and revisions. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Hospital Preparedness, Resilience, and Psychological Burden Among Clinical Nurses in Addressing the COVID-19 Crisis in Riyadh, Saudi Arabia

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In the continuous effort to minimize the devastating effects of coronavirus disease (COVID-19) and to curb the spread of the disease, hospital preparedness and resilience play significant roles in the psychological well-being of clinical nurses given that their work demands immediate action to adapt and adjust to stressors. Thus, this study investigates the hospital preparedness, psychological burden, and resilience of clinical nurses in addressing COVID-19 in Riyadh, Saudi Arabia. A total of 281 clinical nurses participated in the survey from April 2020 to June 2020. Results show that clinical nurses perceived a high self-assessed COVID-19 hospital preparedness (49.65,  $SD = 2.30$ ); high self-assessed nurses' resilience (4.03,  $SD = 0.36$ ); and most have normal levels of depression, anxiety, and stress. The variables were predicted to be statistically significant ( $F_{18,262} = 4.14, p = 0.001$ ) and accounted for 16.8% of the variance in the nurses' perception of hospital preparedness ( $R^2 = 0.221$ ; adjusted  $R^2 = 0.168$ ). The regression analysis was statistically significant ( $F_{30,250} = 6.71, p = 0.001$ ) and accounted for 38% of the variance in nurses' resilience ( $R^2 = 0.446$ , Adjusted  $R^2 = 0.380$ ). The predictors of depression, anxiety, and stress show that the overall relationship was statistically significant at ( $F_{23,257} = 6.71, p < 0.001$ ), ( $F_{23,257} = 6.675, p 0.000$ ), and ( $F_{23,257} = 6.692, p 0.000$ ) with 31.9% of the variance ( $R^2 = 0.375$ , Adjusted  $R^2 = 0.319$ ), 31.8% of the variance ( $R^2 = 0.374$ , Adjusted  $R^2 = 0.318$ ), and 31.9 % of the variance ( $R^2 = 0.375$ , Adjusted  $R^2 = 0.319$ ), respectively. The findings of this study helps in improving the continuing education program, psychological support, and mental health program to ensure that the needs of clinical nurses are addressed during the outbreak of a disease.

**Keywords:** clinical nurses, COVID-19 crisis, hospital preparedness, nurses' resilience, psychological burden

## INTRODUCTION

In December 2019, Wuhan, China reported the first case of the coronavirus disease (COVID-19) (1). Saudi Arabi was among the first countries that implemented precautionary measures [e.g., stopping direct flights between Saudi Arabia and China (2); suspension of Umrah pilgrims; and banning of inbound travel from countries with active COVID-19 cases (3)] to prevent the entry of

the disease. However, despite the early implementation of the safety measures by the Saudi Arabia government, the first COVID-19 case was reported on March 2, 2020 because of the undeclared travel history of one traveler from Iran (3). The emergence of COVID-19 in Saudi Arabia resulted in the implementation of stricter rules to prevent the spread of the disease. The Saudi government totally suspended Umrah, Mosques were closed, schools and universities shifted to online learning, travel ban was ordered to all affected countries, and quarantine became mandatory for passengers. Individuals who were infected with COVID-19 were offered free hospitalization (4). As of June 7, 2020, Saudi Arabia has an approximate total of 101,914 COVID-19 patients with 712 deaths (5). This number is expected to increase further if the disease remains uncontrolled. The increasing number of COVID-19 cases puts health professionals at risk for the disease. The nursing staff at the frontlines are at most risk of becoming infected with the disease as the human transmission becomes evident with close contact to the carrier source. The unprecedented increase in the number of COVID-19 patients, person under investigation (PUI), and person under monitoring (PUM) necessitates a response from hospital management through the implementation of guidelines and procedures within a facility in coordination with the local authorities.

Hospital preparedness is integral in maintaining health services and controlling the spread of COVID-19. It involves the prevention, containment, management, monitoring, and identification of persons with COVID-19 or those exposed to them by implementing facility protocol (6). These measures include the training of healthcare personnel (HCP) on infection prevention and control policies, rapid identification, and isolation of patients confirmed or suspected to have COVID-19; placement of patients in appropriate isolation rooms; transmission-based precaution with the use of the appropriate personal protective equipment (PPE); moving a patient with confirmed or suspected COVID-19 within the facility; hand hygiene; environment cleaning; and limiting visitor access (7). Chopra et al. (8) projected that the large influx in the cases will continue to challenge bed capacity, equipment, and HCP in hospitals. The American Nurses Association (ANA) (9) emphasized the importance of the proper implementation of protocols and guidelines in managing COVID-19. During the early phase of the COVID-19 pandemic, no hospital has a well-established clinical protocol or treatment; resources, such as PPE, are limited (10); and the work load of nurses increased (11). These factors can result in mental health problems, such as stress, physical and mental fatigue, and irritability, among nurses (10).

Resilience is defined as the ability to face adverse situations while remaining focused and optimistic for the future (9). This attribute is considered vital for clinical nurses who are continually confronted with competing priorities and a complex healthcare system. With the ongoing pandemic and already stretched nursing staffing, clinical nurses are pushed to the edge with even higher work demands. The shortage of PPE increases the threat to their well-being (12). In Wuhan, China, nurses increase the resilience of their colleagues by comforting and helping each other (13). Gratitude from the public also improves

nurses' resilience with praiseworthy feedback and positive image (14). At this moment, nurses' resilience is essential for them to respond to this adversity favorably.

The increasing workload and negative effects of a pandemic may give rise to psychological burden among clinical nurses. As a result, their work performance may decline (15). Nurses are working extensively to ensure that the needs of the patients are attended. As nurses help in the journey of addressing this disease, maintaining and improving of their mental health are as important as improving their knowledge and skills on how to defeat the virus. The normal daily activities of nurses are already very stressful (16) and often have a negative effect on their mental health. The COVID-19 outbreak is a stressful situation that causes fear and anxiety among HCP because they have high likelihood of acquiring the disease. HCP in China have been infected with the disease, and many of them are exposed because of the shortage in PPE (13). In a study conducted in Wuhan, China, nurses were found to experience a severe degree of mental health symptoms (17). The unfortunate avoidance of family members and friends due to stigma, lack of PPE, the physical strain of PPE, preparing and keeping up-to-date with the best practices against COVID-19, and the risk of acquiring COVID-19 cause psychological burdens to nurses (18). In the unending continuous to minimize the devastating effects of COVID-19 and to curb the spread of the disease, resilience plays a significant role in the psychological well-being of clinical nurses given that their work demands immediate action to adapt and adjust to stressors. Thus, this study focuses on understanding hospital preparedness, psychological burden, and resilience of clinical nurses in addressing COVID-19.

## AIM OF THE STUDY

This study aims to determine the predictors of hospital preparedness in managing COVID-19 patients and the psychological burden and resilience among clinical nurses in addressing the COVID-19 crisis in Saudi Arabia. It also seeks to determine the effects of hospital preparedness in managing COVID-19 patients to nurses' resilience and hospital preparedness in managing COVID-19 patients and nurses' resilience to the psychological burden of clinical nurses in addressing the COVID-19 crisis in Riyadh, Saudi Arabia.

## METHOD

This cross-sectional design was conducted in two government hospitals in Riyadh Region, Saudi Arabia from April 2020 to June 2020.

### Sampling and Sampling Technique

This study was conducted in two government hospitals in Riyadh, Saudi Arabia. Hospital A is a training hospital, whereas hospital B is a non-training hospital. Both hospitals are COVID-19 designated facilities. These hospitals provide various medical and nursing services for emergency, outpatient, inpatient, and homecare patients. These hospitals also have infectious control

and Middle East respiratory syndrome coronavirus (MERS-COV) policies and guidelines, infectious units, and mental health programs for their employees. The study population was composed of Saudi and non-Saudi clinical nurses who met the study inclusion criteria of being employed in the research site hospital. The inclusion criteria for the respondents of the study included nurses who are on active duty during the COVID-19 crisis and license nurse practitioners in Saudi Arabia who are willing to be part of the study. The exclusion criteria were nurses who are on leave during the COVID-19 crisis and those who refused to participate in the study. The study had a total of 281 respondents, and convenient sampling technique was applied. The actual power after *post-hoc* analysis of the G\*Power program (version 3.1.9.4) using the *t*-test model, two predictor variables, medium expected effect size ( $d = 0.5$ ), and a 5% level of significance is 0.99.

### Data Gathering Instrument

Demographic data were obtained to describe the respondents. Three instruments were used to obtain data: (1) Hospital Preparedness Assessment Tool, (2) the Depression, Anxiety, and Stress Scale—21 (DASS-21), and (3) the Resilience Scale for Nurses. The researcher received approval for the use of DASS-21 and Resilience Scale for nurses.

### Hospital Preparedness Assessment Tool

This hospital preparedness assessment tool was adapted from the Control for Disease Control and Prevention (CDC) protocol. The element of this protocol is “infection prevention and control policies and training for HCP, the process for the rapid identification and isolation of patients with confirmed or suspected COVID-19, patient placement, transmission-based precaution, movement of a confirmed or suspected COVID-19 patient within the facility, hand hygiene, environment cleaning, monitoring, and managing HCP, and visitor access and movement within the facility” (18). The questionnaire includes YES or NO questions, wherein the staff nurses will determine if the item is present or being practiced in their workplace. The scale level content validity index (S-CVI) score averaging method of the tool based on the evaluation of five experts, which include nurse supervisors, nurse educators in the hospital, and a nurse infectious manager, is 1. According to Polit and Beck (19), a S-CVI score of 1 with 3–5 experts is valid.

### DASS-21

DASS-21 is a tool used to measure the psychological burden of nurses in addressing COVID-19. DASS-21 is a 21-item self-administered questionnaire used to assess depression, anxiety, and stress with 7 items. The “depression” part of the DASS-21 measures low mood, motivation, and self-esteem; the “anxiety” part focuses on physiological arousal, perceived panic, and fear; and the stress part involves tension and irritability. Cronbach's  $\alpha$  revealed a result of 0.84 to 0.92 for DASS-Anxiety, 0.90–0.95 for DASS-Stress, and 0.96–0.97 for DASS-Depression (20). To determine DASS severity rating, the score of every statement for each scale (e.g., depression, anxiety, and stress) were added. The total score of the items in each group (e.g., depression,

anxiety, and stress) were compared with the severity rating of the three scales to determine their severity labels. If the total score of the items in depression subscale is 0–4, 5–6, 7–10, and 14 and above, then it is interpreted as normal, mild, severe, and extremely severe, respectively. Meanwhile, if the total score of the subscale stress is 0–3, 4–5, 6–7, 8–9, and 10 and above, then the severity label is normal, mild, moderate, severe, and extremely severe, respectively. In the stress subscale, a total score of 0–7, 8–9, 10–12, 13–16, and 17 and above is considered normal, mild, moderate, severe, and extremely severe.

### Resilience Scale for Nurses

The Resilience Scale for Nurses is composed of 22 items validated by Ihara et al. (21). The tool has four principal factors that consist of positivity in nursing, which has eight items; interpersonal skills, which has five items; having an anchor in personal life, which has five items; and response to novelty, which has four items. The overall Cronbach's alpha of RSN is 0.84, “positivity in nursing” is 0.87, interpersonal skills is 0.77, “having an anchor in personal life” is 0.76, and a “response to novelty” is 0.63 (22).

### Data Gathering Procedure

A letter of request for permission to conduct a study was forwarded to the research committee of the institution. Upon approval, an abstract was presented for review by the Research Ethics Committee at the Ministry of Health (MOH), Saudi Arabia. Upon ethics approval, a letter was presented to the Nurse and Medical Director of the participating institution. The list of staff nurses was obtained from the head nurse and/or supervisor of the hospital. The researchers/research assistant explained the importance, procedure, and advantages of the study before asking the respondents to sign the consent form. Once permission has been given by the potential respondent, the researcher/research assistant administered the questionnaire to them. The respondent was informed that indicating his/her name is optional, but a tracking number is included to ensure that no respondent was given the questionnaire more than once.

The questionnaires were distributed in the ward assignment of the nurses. The researcher/research assistant distributed three questionnaires to those willing to partake in the study. The respondents were instructed to answer the questionnaire personally and to contact the researcher for any clarifications, concerns, or problems encountered while answering the tool. For busy respondents, the data gathering tool was retrieved after 2 days or depending on the time set by the respondent and researcher. Once the questionnaire has been received by the researcher, it was checked for any missing data. If any item was left without any answer, then the researcher will ask the respondent to answer the missing item(s). The results were analyzed after the data were tallied and tabulated. The collected data were kept in a folder file with a security code in the personal computer of the primary researcher. Only the primary researcher can access the secured folder file.

### Ethical Consideration

The University Research Committee and the MOH of Saudi Arabia ensured the ethical conduct of the study. Confidentiality

was maintained by avoiding data that could associate the response of the respondent to their identity. The aims, purpose, and process of research were discussed with the respondents. Respondents were allowed to ask questions and withdraw from the study if they feel that their rights were being violated. Perceived coercion was avoided by ensuring the absence of an existing power relations between the researchers and the respondents or by using a middleman to contact the respondents. The respondent was also informed that no additional data apart from the survey information will be taken.

## Statistical Analysis

Data related to the descriptive data form and the scales used were evaluated in SPSS 23 program version 22.0. Sociodemographic data were presented with mean, percentages, and frequency analysis. The predictors of hospital preparedness, resilience, and psychological burden of nurses, hospital preparedness predicting nurses' resilience, and hospital preparedness and nurses' resilience predicting psychological burden were evaluated using linear multiple regression analysis.

## RESULTS

A total of 281 clinical nurses in Riyadh, Saudi Arabia participated in the study. More than half of the respondents are from hospital A (77.94%). Most of the respondents are females (85.8%), Bachelor of Science in Nursing (BSN) graduates (84.7%), and Christians (75.8%). The mean age was 33.25 ( $SD = 6.38$ ). The largest group of respondents include Filipinos (58.7%) as compared with Saudi national Nurses (12.1%). Most of the respondents are Emergency Room (ER) nurses (31.7%), and more than half have provided care for a confirmed COVID-19 case (65.2%). The mean years of experience of the nurses were 10.66 ( $SD = 6.37$ ). The mean of the self-assessed degree of confidence of nurses on the government response to COVID-19 was 8.07 ( $SD = 1.82$ ), 8.17 ( $SD = 1.47$ ) for public authorities, and 8.34 ( $SD = 1.47$ ), and 8.46 ( $SD = 1.53$ ) for hospital administration and nursing administration, respectively indicating high level of confidence (Table 1).

## COVID-19 Hospital Preparedness, Resilience, and Psychological Burden of Nurses

The results of the descriptive analyses of the clinical nurses' perception of COVID-19 hospital preparedness, resilience, and psychological burden in Riyadh, Saudi Arabia are presented in Table 2. Most clinical nurses perceived a high self-assessed COVID-19 hospital preparedness, as evidenced by the mean score of 49.65 ( $SD = 2.30$ ). Furthermore, all COVID-19 hospital preparedness subscales were rated as high.

The clinical nurses perceived a high self-assessed resilience, as shown by the mean of 4.03 ( $SD = 0.36$ ). The subscales of resilience, namely, "Positivity in nursing" (4.60,  $SD = 0.41$ ), "Interpersonal skills" (4.09,  $SD = 0.51$ ), "Having an anchor in personal life" (4.05,  $SD = 0.48$ ), and "Response to novelty" (3.99,  $SD = 0.76$ ), were also perceived as high by the clinical nurses.

**TABLE 1 |** Demographics ( $n = 281$ ).

Variables	n	%
<b>GENDER</b>		
Female	241	85.8
Male	40	14.2
<b>EDUCATIONAL ATTAINMENT</b>		
Diploma	43	15.3
BSN	238	84.7
<b>NATIONALITY</b>		
Saudi	34	12.1
Filipino	165	58.7
Indian	82	29.2
<b>MARITAL STATUS</b>		
Single	107	38.1
Married	174	61.9
<b>RELIGION</b>		
Muslim	43	15.3
Christian	213	75.8
Hindi	25	8.9
<b>CLINICAL AREA</b>		
ER	89	31.7
ICU	30	10.7
OPD	25	8.9
Medical-Surgical Ward	82	29.2
Isolation ward	31	11.0
Operating Room	24	8.5
<b>PROVIDED CARE FOR CONFIRMED COVID-19 CASE</b>		
No	123	43.8
Yes	158	56.2
<b>PROVIDED CARE FOR SUSPECTED COVID-19 CASE</b>		
No	257	91.5
Yes	24	8.5
	Mean	SD
Age	33.25	6.38
Year of experience	10.66	6.37
Degree of confidence on the government	8.07	1.82
Degree of confidence on the public health authorities	8.17	1.47
Degree of confidence on the hospital administration	8.24	1.47
Degree of confidence on the nursing administration	8.46	1.53

The percentage of respondents with a normal level of depression is 51.2% ( $n = 144$ ), 36.3% ( $n = 102$ ) have normal level of anxiety, and 82.2% ( $n = 231$ ) have normal level of stress while addressing COVID-19 crisis. Meanwhile, 23.5 ( $n = 66$ ) of the respondents have moderate depression, 19.5% ( $n = 55$ ) perceived a mild degree, and 5.7% ( $n = 16$ ) had severe depression during the COVID-19 crisis. In terms of anxiety, 37.4% ( $n = 105$ ) have moderate anxiety, 12.1% ( $n = 34$ ) have severe anxiety, 7.5% ( $n = 21$ ) have extremely severe anxiety, and 6.8% ( $n = 19$ ) have mild anxiety during the COVID-19 crisis. Furthermore, during the COVID-19 crisis, 8.5% ( $n = 24$ ) of the respondents have moderate stress, 5.7% ( $n = 16$ ) have mild stress, 2.85% ( $n = 8$ ) have severe stress, and ~0.7% perceived extremely severe stress.



**TABLE 2** | Results of the descriptive analyses of the different variables ( $n = 281$ ).

Variable	Mean	SD	
COVID-19 Preparedness of the hospital	49.65	2.30	
Infection prevention and control policies and training for healthcare personnel	6.92	0.27	
Process for rapidly identifying and isolating patients with confirmed or suspected COVID-19	11.30	0.95	
Patient placement	9.46	0.83	
Transmission-Based Precautions	3.85	0.53	
Movement of patients with confirmed or suspected COVID-19 within the facility	2.88	0.51	
Hand hygiene	1.95	0.30	
Environmental cleaning	4.66	0.74	
Monitoring and managing healthcare personnel	2.94	0.29	
Visitor access and movement within the facility	5.70	0.70	
Resilience	4.03	0.36	
Positivity in nursing	4.60	0.41	
Interpersonal skill	4.09	0.51	
Having an anchor in personal life	4.05	0.48	
Response to novelty	3.99	0.76	
Depression	9.53	6.49	n (%)
Normal			144 (51.2)
Mild			55 (19.6)
Moderate			66 (23.5)
Severe			16 (5.7)
Anxiety	9.87	6.05	
Normal			102 (36.3)
Mild			19 (6.8)
Moderate			105 (37.4)
Severe			34 (12.1)
Extremely severe			21 (7.5)
Stress	10.12	7.27	
Normal			231 (82.2)
Mild			16 (5.7)
Moderate			24 (8.5)
Severe			8 (2.8)
Extremely severe			2 (0.7)

## Multiple Regression Analysis on the Nurses' Perception of Hospital Preparedness

Multiple regression analysis was used to determine the predictors of hospital preparedness in Riyadh, Saudi Arabia during the COVID-19 crisis, as perceived by staff nurses. The variables were predicted to be statistically significant ( $F_{18,262} = 4.14$ ,  $p = 0.001$ ) and accounted for 16.8% of the variance in the nurses' perception of hospital preparedness ( $R^2 = 0.221$ ; adjusted  $R^2 = 0.168$ ). As presented in **Table 3**, hospital, gender, clinical area, provided care with confirmed cases, and degree of confidence on the government effort against the pandemic were revealed

as significant factors for predicting the nurses' perception of hospital preparedness. Specifically, nurses who work in Hospital B have a lower mean score of 1.15 ( $p = 0.020$ ,  $CI = -2.12, -0.19$ ) as compared with those working in Hospital A. A point increase in female respondent mean score indicates a decrease in the mean score of male respondents of 1.32 ( $p = 0.001$ ,  $CI = -2.08, -0.56$ ). Similarly, medical-surgical (MS) ward nurses and operating room (OR) nurses have a lower mean of 1.30 ( $p = 0.004$ ,  $CI = -2.19, -0.41$ ) and 2.50 ( $p < 0.001$ ,  $CI = -3.75, -1.26$ ) than the mean score of ER nurses, respectively. The nurses who provided care to patients with COVID-19 perceived a higher mean score of 1.22 ( $p = 0.003$ ,  $CI = 0.41, 2.03$ ) as compared with those who did not provide care to patients with COVID-19. A point increase in the degree of confidence of clinical nurses on the ability of the government to control COVID-19 cases corresponds to a 0.25 ( $p = 0.039$ ,  $CI = 0.01, 0.49$ ) increase in the perceived hospital preparedness of nurses in Riyadh, Saudi Arabia.

## Multiple Regression Analysis of Nurses' Resilience

Multiple regression analysis was conducted to examine the predictors of clinical nurses' resilience during the COVID-19 crisis. The regression analysis was statistically significant ( $F_{30,250} = 6.71$ ,  $p < 0.001$ ) and accounted for 38% of the variance in nurses' resilience ( $R^2 = 0.446$ , Adjusted  $R^2 = 0.380$ ). As presented in **Table 4**, age, years of experience, area of assignment of nurses, degree of confidence on the public health authorities and hospital administration, and the hand hygiene subscale of hospital preparedness were revealed as significant factors for predicting nurses' resilience. Specifically, the addition year in the age of the respondent corresponds to 0.02 ( $p = 0.027$ ,  $CI = 0.00, 0.03$ ) increase in nurses' resilience. The years of experience had a positive influence on nurses' resilience by 0.03 ( $p = 0.001$ ,  $CI = 0.05, 0.02$ ). The result observed on nurses assigned in the MS and isolation wards had decreased mean scores of 0.16 ( $p = 0.42$ ,  $CI = -0.25, -0.01$ ) and 0.16 ( $p = 0.020$ ,  $CI = 0.30, -0.03$ ), respectively, as compared with the mean score of ER nurses. The increase in the degree of confidence of nurses on the government resulted in 0.06 ( $p = 0.001$ ,  $CI = -0.09, -0.02$ ) decrease in the perceived nurses' resilience. A point increase in the degree of confidence of nurses in hospital administration corresponds to 0.10 ( $p = 0.002$ ,  $CI = -0.16, -0.04$ ) decrease on nurses' resilience. A point increase in the degree of confidence of nurses on the public health authorities resulted in 0.14 ( $p < 0.001$ ,  $CI = 0.10, 0.18$ ) increase in the nurses' resilience. As to the hospital preparedness subscale, a point increase in the mean score of hand hygiene corresponds to 0.31 ( $p < 0.001$ ,  $CI = -0.46, -0.15$ ) decrease on nurses' resilience.

## Predictors of Depression, Anxiety, and Stress

Multiple regression analysis was conducted to examine the predictors of depression of clinical nurses during the COVID-19 crisis in Riyadh, Saudi Arabia. The regression model accounted 31.9% of the variance in depression ( $R^2 = 0.375$ , Adjusted  $R^2 = 0.319$ ), and the overall relationship was statistically significant

**TABLE 3** | Result of the multiple regression analysis on the nurses' perception of hospital preparedness ( $n = 281$ ).

Predictor variables	$\beta$	SE-b	$p$	95% CI	
				Lower	Upper
Hospital	-1.15	0.49	0.020*	-2.12	-0.19
Gender	-1.32	0.39	0.001**	-2.08	-0.56
Age	-0.10	0.05	0.067	-0.20	0.01
Educational attainment	-0.01	0.56	0.983	-1.11	1.09
Year of experience	0.10	0.06	0.066	-0.01	0.21
<b>NATIONALITY (REFERENCE: SAUDI)</b>					
Filipino	-0.78	0.46	0.092	-1.69	0.13
Indian	-0.41	0.54	0.449	-1.46	0.65
<b>AREA (REFERENCE: ER)</b>					
ICU	-0.88	0.51	0.087	-1.89	0.13
OPD	0.42	0.56	0.461	-0.69	1.52
Medical-Surgical Ward	-1.30	0.45	0.004**	-2.19	-0.41
Isolation Ward	-0.34	0.51	0.507	-1.34	0.66
Operating Room	-2.50	0.63	<0.001***	-3.75	-1.26
Provided care with confirmed case	1.22	0.41	0.003**	0.41	2.03
Provided care with suspected case	-1.90	0.56	0.001**	-3.00	-0.80
Degree of confidence on the government	0.25	0.12	0.039*	0.01	0.49
Degree of confidence on the public health authorities	0.04	0.14	0.801	-0.24	0.31
Degree of confidence on the hospital administration	0.04	0.23	0.858	-0.42	0.50
Degree of confidence on the nursing administration	-0.25	0.22	0.250	-0.68	0.18

The dependent variable was the nurses' perception of hospital preparedness.  $\beta$  is the unstandardized coefficients; SE-b is the Standard error.  $R^2 = 0.221$ , Adjusted  $R^2 = 0.168$ .

\*Significant at 0.05, \*\*Significant at 0.01, \*\*\*Significant at 0.001.

( $F_{23,257} = 6.692$ ,  $p < 0.001$ ). As presented in **Table 5**, gender, educational attainment, nationality, marital status, religion, area of assignment of nurses, degree of confidence on the government, public health authorities and hospital administration, and nurses' resilience were revealed as significant factors for predicting the nurses' psychological burden. Specifically, nurses in Hospital B have a higher depression mean score, by 3.09, than those in Hospital A. Depression score was negatively correlated to age and degree of confidence in public health authorities, which decreased by 0.44 for every increase in age and by 1.17 for every increase in the degree of confidence of nurses to public health authorities. Females have a lower mean score than males by 2.55. Diploma nurses have a lower mean score than BSN by 4.36. Similarly, Filipino and Indian nurses have a lower mean score than Saudi national nurses by 7.10 and 8.97, respectively. Single nurses also have a lower mean score than married nurses by 2.63. Nurses who did not provide care to a COVID-19 patient has a lower mean score by 2.12 than those who provide care to a COVID-19 patient. A point increase in the degree of confidence of nurses on the public health authorities corresponds to a 1.17 decrease on the nurse's depression mean score. Meanwhile, a point of increase in the degree of confidence of nurses on the government and hospital administration resulted in 0.88 and 1.36 increment in the depression mean score of nurses. Isolation ward nurses' depression mean score is higher by 4.35 than ER nurses.

A point of increase in the nurses' resilience corresponds to a decrease of 4.09 depression mean score of nurses.

As to the predictors of the anxiety of clinical nurses during the COVID-19 crisis in Riyadh, Saudi Arabia, the regression analysis was statistically significant ( $F_{23,257} = 6.675$ ,  $p < 0.001$ ) with 31.8% of the variance in anxiety ( $R^2 = 0.374$ , Adjusted  $R^2 = 0.318$ ). **Table 5** shows that with other variables held constant, female nurses' anxiety mean scores are lower by 2.86 than those of male nurses. Similarly, nurses with diplomas had a lower mean than BSN nurses by 5.52. Filipino and Indian nurses' anxiety mean scores were lower than Saudi national nurses by 6.17 and 8.78, respectively. MS, isolation ward, and OR nurses have higher anxiety mean scores than ER nurses by 2.20, 2.57, and 4.17, respectively. Nurses who provide care to confirmed COVID-19 patients have lower anxiety mean scores than those who do not provide care to COVID-19 patients by 4.76. A point increase in the degree of confidence of nurses in public health authorities and nursing administration led to a decrease of 0.99 and 1.38 of the anxiety mean score, respectively, whereas a point increase in the degree of confidence of nurses on the hospital administration corresponds to 2.59 increase in the anxiety mean score of nurses.

With regards to the predictors of the stress of clinical nurses during COVID-19 crisis in Riyadh, Saudi Arabia, the regression analysis was statistically significant ( $F_{23,257} = 6.692$ ,  $p < 0.001$ ) with a 31.9% of the variance in stress ( $R^2 = 0.375$ , Adjusted

**TABLE 4** | Result of the multiple regression analysis on the nurses' resilience ( $n = 281$ ).

Predictor variable	$\beta$	SE- $b$	$p$	95% CI	
				Lower	Upper
Hospital	0.08	0.07	0.281	-0.07	0.22
Gender	0.01	0.06	0.884	-0.10	0.12
Age	0.02	0.01	0.027*	0.00	0.03
Educational attainment	-0.04	0.08	0.666	-0.20	0.13
Year of experience	-0.03	0.01	<0.001***	-0.05	-0.02
<b>NATIONALITY (REFERENCE: SAUDI)</b>					
Filipino	-0.00	0.12	0.996	-0.24	0.24
Indian	0.05	0.14	0.731	-0.22	0.32
Marital status	-0.04	0.06	0.486	-0.15	0.07
Religion (Reference: Muslim)					
Christian	0.06	0.11	0.601	-0.16	0.28
Hindu	0.02	0.13	0.868	-0.23	0.27
<b>AREA (REFERENCE: ER)</b>					
ICU	-0.02	0.07	0.832	-0.16	0.13
OPD	0.11	0.08	0.171	-0.05	0.26
Medical-Surgical Ward	-0.13	0.06	0.042*	-0.25	-0.01
Isolation Ward	-0.16	0.07	0.020*	-0.30	-0.03
Operating Room	0.03	0.18	0.850	-0.32	0.39
Provided care with confirmed case	0.11	0.06	0.064	-0.01	0.22
Provided care with suspected case	-0.01	0.08	0.924	-0.17	0.16
Degree of confidence on the government	-0.06	0.018	0.001**	-0.09	-0.02
Degree of confidence on the public health authorities	0.14	0.02	<0.001***	0.10	0.18
Degree of confidence on the hospital administration	-0.10	0.03	0.002**	-0.16	-0.04
Degree of confidence on the nursing administration	0.00	0.03	0.883	-0.06	0.06
Infection prevention and control policies and training for healthcare personnel	0.03	0.18	0.858	-0.32	0.38
Process for rapidly identifying and isolating patients with confirmed or suspected COVID-19	-0.04	0.02	0.055	-0.08	0.00
Patient placement	-0.00	0.02	0.918	-0.05	0.05
Transmission-Based Precautions	0.08	0.04	0.056	-0.00	0.17
Movement of patients with confirmed or suspected COVID-19 within the facility	0.01	0.05	0.921	-0.09	0.10
Hand hygiene	-0.31	0.08	<0.001***	-0.46	-0.15
Environmental cleaning	0.03	0.03	0.411	-0.04	0.09
Monitoring and managing healthcare personnel	0.06	0.12	0.617	-0.17	0.29
Visitor access and movement within the facility	-0.05	0.05	0.288	-0.14	0.04

The dependent variable was the nurses' perception of nurses' resilience.  $\beta$  is the unstandardized coefficients; SE- $b$  is the Standard error.

$R^2 = 0.446$ , Adjusted  $R^2 = 0.380$ .

\*Significant at 0.05, \*\*Significant at 0.01, \*\*\*Significant at 0.001.

$R^2 = 0.319$ ). **Table 5** shows that with other variables held constant, nurses with a diploma had lower stress mean score than BSN nurses by 4.44. Filipino and Indian nurses' stress mean scores were lower than Saudi national nurses by 7.14 and 8.82, respectively. Single nurses have a lower mean score than married nurses by 4.55. Isolation ward and OR nurses have higher stress mean scores than ER nurses by 4.80 and 5.37, respectively. Nurses who provide care to confirmed COVID-19 patients have lower stress mean scores than those nurses who did not provide care to COVID-19 patients by 5.47. A point increase in the degree of

confidence of nurses in public health authorities corresponded to a decrease of 1.30 in anxiety mean score, whereas a point increase in the degree of confidence of nurses on the hospital administration corresponds to a 2.64 increase in the anxiety mean score of nurses.

## DISCUSSION

The finding of this study shows that clinical nurses in Riyadh, Saudi Arabia have high perception of hospital preparedness in

**TABLE 5** | Predictors of depression, anxiety, and stress ( $n = 281$ ).

Predictors	Depression					Anxiety					Stress							
	$\beta$	SE-b	$p$	95% CI		$\beta$	SE-b	$p$	95% CI		$\beta$	SE-b	$p$	95% CI				
				Lower	Upper				Lower	Upper				Lower	Upper			
Hospital	3.09	1.34	0.022*	0.46	5.73	-1.27	1.25	0.312	-3.72	1.19	2.56	1.50	0.089	-0.39	5.51			
Gender	-2.55	1.03	0.014*	-4.57	-0.53	-2.86	0.96	0.003**	-4.75	-0.97	-2.14	1.15	0.065	-4.40	0.13			
Age	-0.44	0.15	0.003**	-0.72	-0.15	-0.10	0.14	0.441	-.37	0.16	-0.29	0.16	0.075	-0.61	0.03			
Educational attainment	-4.36	1.50	0.004**	-7.32	-1.41	-5.52	1.40	<0.001***	-8.28	-2.76	-4.44	1.68	0.009**	-7.76	-1.13			
Year of experience	0.52	0.16	0.001**	0.22	0.83	0.14	0.14	0.350	-0.15	0.42	0.34	0.17	0.054	-0.01	0.68			
<b>NATIONALITY (REFERENCE: SAUDI)</b>																		
Filipino	-7.10	2.20	0.001**	-11.438	-2.770	-6.17	2.05	0.003**	-10.22	-2.13	-7.14	2.47	0.004**	-12.00	-2.29			
Indian	-8.97	2.54	<0.001***	-13.960	-3.972	-8.78	2.37	<0.001***	-13.44	-4.11	-8.82	2.84	0.002**	-14.42	-3.23			
Marital status	-2.63	1.03	0.011*	-4.648	-0.610	-5.65	0.96	<0.001***	-7.54	-3.77	-4.55	1.15	<0.001***	-6.81	-2.28			
<b>RELIGION (REFERENCE: MUSLIM)</b>																		
Christian	8.96	2.03	<0.001***	4.96	12.96	6.76	1.90	<0.001***	3.02	10.49	10.18	2.28	<0.001***	5.69	14.66			
Hindu	6.31	2.34	0.007**	1.71	10.90	6.10	2.18	0.005**	1.81	10.39	8.78	2.62	0.001**	3.63	13.94			
<b>AREA (REFERENCE: ER)</b>																		
ICU	-0.51	1.32	0.703	-3.11	2.10	0.86	1.24	0.489	-1.58	3.29	0.18	1.48	0.903	-2.74	3.10			
OPD	-0.44	1.46	0.761	-3.32	2.43	0.06	1.36	0.964	-2.62	2.74	0.95	1.64	0.562	-2.27	4.17			
Medical-Surgical Ward	0.89	1.19	0.454	-1.45	3.23	2.20	1.11	0.048*	0.02	4.39	2.55	1.33	0.056	-0.07	5.18			
Isolation Ward	4.35	1.33	0.001*	1.74	6.96	2.57	1.24	0.039*	0.13	5.00	4.80	1.49	0.001**	1.87	7.73			
Operating Room	1.09	1.69	0.522	-2.25	4.42	4.17	1.58	0.009**	1.05	7.28	5.37	1.90	0.005**	1.64	9.11			
Provided care with confirmed case	-2.12	1.09	0.052	-4.27	0.02	-4.76	1.02	<0.001***	-6.76	-2.76	-5.47	1.22	<0.001***	-7.88	-3.07			
Provided care with suspected case	0.64	1.48	0.663	-2.26	3.55	1.63	1.38	0.237	-1.08	4.34	1.16	1.65	0.483	-2.09	4.42			
Degree of confidence on the government	0.88	0.33	0.008**	0.24	1.53	0.11	0.31	0.711	-0.49	0.72	0.34	0.37	0.350	-0.38	1.07			
Degree of confidence on the public health authorities	-1.17	0.40	0.004**	-1.95	-0.38	-0.99	0.37	0.008**	-1.72	-0.26	-1.30	0.45	0.004**	-2.18	-0.43			
Degree of confidence on the hospital administration	1.36	0.61	0.026*	0.16	2.57	2.59	0.57	<0.001***	1.47	3.72	2.64	0.68	<0.001***	1.29	3.98			
Degree of confidence on the nursing administration	-1.02	0.57	0.073	-2.13	0.09	-1.38	0.53	0.010*	-2.41	-0.34	-1.17	0.63	0.066	-2.41	0.08			
Hospital Preparedness	-0.01	0.16	0.947	-0.33	0.31	0.24	0.15	0.108	-0.05	0.54	0.15	0.18	0.391	-0.20	0.51			
Resilience	-4.09	1.16	0.001**	-6.37	-1.80	-1.90	1.08	0.081	-4.03	0.23	-1.62	1.30	0.213	-4.18	0.94			
R <sup>2</sup> (Adjusted R <sup>2</sup> )				0.375(0.319)						0.374 (0.318)						0.375 (0.319)		

combating COVID-19. This finding implies that the hospital is playing its role in preventing and controlling the disease. The hospital is complying with the policies and guidelines set by the WHO and CCDC in response to COVID-19. The guidelines and policies are implemented properly to ensure that staff, patients, and visitors are protected. The finding of the study further shows that the preparedness of the hospital is based on the immediate action executed by the government in response to COVID-19. The government has allocated sufficient funds to ensure hospital readiness in terms of personnel, medicines, availability of equipment, such as hospital beds and ventilators, and other necessary medical supplies, were secured (22). The Saudi government took further extra measures to lessen the consequences of the COVID-19 crisis, which include rapid identification and isolation of confirmed or suspected COVID-19 patients. Currently, no effective medicines or vaccines have been discovered to control and manage COVID-19. For

this reason, isolation and identification of symptomatic and asymptomatic persons with COVID-19 can reduce the spread of the virus (23). Thus, early prevention and control are vital in containing COVID-19.

The finding of this study also shows that during this unprecedented crisis, nurses' resilience is very high, thereby showing their ability to adopt in a very stressful situation. The positive characteristics of the respondents that lead to high resilience include age, years of experience, and degree of confidence in public health authorities. As a person ages, their resilience increases, especially in problem-solving and capability to handle emotional problems (24). During the COVID-19 pandemic, as nurses age, their ability to adjust and adapt to the changes in their work became more evident. The years that nurses have spent providing care to infectious and non-infectious patients have contributed to the development of their resilience. This view is supported by Hart et al. (25) who found



that competence, flexibility, adaptability, hardiness, and sense of coherence in nurses increase resilience. The actions of the public health authorities by providing guidelines and policies to combat COVID-19 have also helped nurses to fulfill their roles and functions. The policies and guidelines issued by the health authorities help nurses to cope and adjust amid the COVID-19 crisis. These policies and guidelines strengthen the ability of the nurses to protect themselves and deliver services in response to COVID-19 while increasing their competence and confidence in dealing with COVID-19 patients. Being competent and confident are strategies to cope, deal, and handle immediate stressors and enhance resilience (26). The novelty of this disease has also helped nurses to be more engaged in understanding and learning up-to-date information to prevent and control COVID-19. This action is considered a part of the health coping strategies that improve their resilience (27). Nurses use their nursing knowledge and skills to adapt psychologically and prevent psychological burden. This notion is evident in the findings of this study on the increased number of nurses who have normal levels of depression, anxiety, and stress.

Although many studies have proven that most nurses experience psychological burden during a pandemic (17), the findings of our study show otherwise. Most of the nurses in our study did not experience depression, anxiety, and stress. This finding is associated with the positive support received by nurses from the government, society, and their families. The support from their family and the society help nurses increase their sense of pride and professional identity (28). Therefore, the inspiration received by nurses from their support system contributes to their psychological adaptation and adjustment during this pandemic.

However, although most of the nurses in this study have normal psychological status, male Saudi national nurses, as well as Christian, Hindu, and nurses providing direct care to COVID-19, were found to be predictors of nurses' psychological burden. Male nurses have a higher mean score than the female nurses, indicating that the former is more prone to psychological burden during this pandemic than the latter. This finding could be associated with the role of males in the family in Asian countries. Males are usually the breadwinners and provide the needs of their family. The fear of spreading the disease to their loved ones and the financial impact of this pandemic are factors that could increase the psychological burden of male nurses. However, this assumption needs further investigation in future studies. Saudi nurses are prone to psychological burden because of the following reasons: contagion and spreading the virus to their families and friends because they are living with them unlike foreign nurses who live in accommodations provided by the hospital. This finding is consistent with that in China, where Chinese nurses experience fear, depression, anxiety, and stress due to COVID-19 (17).

Christians and Hindu have higher mean depression, anxiety, and stress scores than Islamic nurses because of poor religious coping. According to Carver (29), religion is a coping mechanism used to promote positive well-being. During this pandemic, everyone wants to address their spiritual need by attending

church services or consulting with clergies or priests. In Saudi Arabia, the practice of other religious gatherings or services is not allowed, except for Islam. The practice of praying together as a coping mechanism is not allowed. This conflict between religious practices and orientation and culture in Saudi Arabia affects religious coping, thereby increasing their psychological burden. According to Cruz et al. (30), religion is an effective coping mechanism for psychological burden. Religion provides an avenue to cope with a stressful situation and positive support from religious core group members. This view prompted Cruz et al. (31) to posit that the development of a safe working place for Saudi and non-Saudi nurses where they can freely practice their spirituality would be advantageous.

Nurses working in the MS, Isolation, and OR wards have higher psychological burden than ER nurses. MS and OR ward nurses are usually not exposed to COVID-19 patients and have limited clinical experience in providing care to a patient with an infectious disease as compared with isolation ward and ER nurses. Providing care to COVID-19 patients also requires comprehensive and specific management (32). These identified factors increase the psychological burden of MS and OR ward nurses. The experience of an isolation ward nurse has a high mean score in the psychological burden than an ER nurse because of their prolonged exposure to COVID-19 patients. Most patients are admitted at the isolation ward, which predisposes nurses to be more susceptible to contagion. The feeling of being infected increases the psychological burden of nurses (32).

The findings show that nurses' high resilience decreases the mean score of depression and implies that nurses can cope with stressors during this global pandemic and help prevent depression. Self-confidence, calmness, relaxation, and cheerfulness (33) are positive contributors to the emotional stability of nurses. Thus, the finding implies that positive emotions should be strengthened in the psychological dimension to prevent psychological burden.

## LIMITATION OF THE STUDY

The respondents of the study include clinical nurses. Thus, the findings may not be generalized to the other population with different experiences and perceptions in the clinical settings. Nevertheless, it can be replicated. In addition, participants in this study were limited to two settings because of the COVID-19 pandemic. For better representation, future researchers should conduct a wider scale setting. The use of cluster sampling is also recommended to ensure that each facility will have an allocated proportion to generate representativeness of the sample size. The data were gathered using a self-report questionnaire. Thus, the report bias cannot be controlled. There is also limitation in interpreting the psychological burden of the clinical nurses. Since, DASS-21 is not a measure of clinical diagnoses, which means it cannot diagnose depression, anxiety, or stress. Instead, DASS-21 can determine the presence and severity of stress, anxiety, and depression.

## CONCLUSION AND IMPLICATIONS

This research is significant for nursing administrators and staff nurses because it can help them identify the strained aspects of hospital preparedness that need to be improved to strengthen their workplace in the prevention, control, management, and containment of COVID-19. The development of hospital protocols in the handling of confirmed or suspected COVID-19 patients is also effective.

In clinical areas, the findings of this study can help hospital administrators and nursing leaders to identify the strengths and weaknesses of hospital preparedness for confirmed or suspected COVID-19 patients. The hospital can be guided in designing a continuing education program that would enhance hospital preparedness for confirmed or suspected COVID-19 patients.

Nurses have low psychological burden and high resilience. The finding of this study would be of great help in developing psychological support and mental health program to be implemented in times of crisis.

The results of this study may potentially support the scarce data available on hospital preparedness for confirmed or suspected COVID-19 patients, psychological burden, and resilience. The results of this quantitative endeavor can also serve as basis for other similar future research that aim to explore the same topic. This study fills a gap in the literature on hospital preparedness for confirmed or suspected COVID-19 patients, psychological burden, and resilience.

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## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ministry of Health, Saudi Arabia. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

EB substantially contributed to the conception and design of the work analysis, interpretation of data for the work, drafting the work and revising it critically for important intellectual content, final approval of the version to be published, and agreeing to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. NA, EI, and RA substantially contributed to the conception of the work, the acquisition of data for the work, revising it critically for important intellectual content, final approval of the version to be published, and agreeing to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed to the article and approved the submitted version.

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# Mental Health and Coping in the Shadow of the COVID-19 Pandemic: The Israeli Case

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The COVID-19 pandemic caught the entire world off guard. Israel, similar to all other nations, was forced to cope with the unknown. “Flattening the curve” of infections has become a common term among specialists and decision makers, while explaining restricting measurements taken toward the population. Israelis, who had previously learned to deal with life under constant security threat, are now facing a new reality. The purpose of the study was to check how Israelis are psychologically affected by and coping with the COVID-19 pandemic. The study included 925 Israelis divided into three groups: ages 18–29, 30–59, and 60–88. The data were collected between March 31 and April 8, 2020, when it was already clear that this is a global plague, the country’s borders were closed, and the government’s directive for citizens was to remain at home while imposing limitations on the public and private sectors. The current study examined psychological distress among the three age groups as well as the associations between levels of distress, resilience, and coping strategies. Levels of distress were measured via the BSI-18 that measures anxiety, depression, and somatization. Resilience was measured using the Connor-Davidson CD-RISC scale. Coping was measured by the short version of the COPE. Psychological distress was associated with being in a younger age group, being a woman, having economic concerns, use of emotion and problem focused coping, and lower resilience. The study also found that concern for the health of family members was the strongest concern among all age groups but was highest among the younger age group. It was also found that those in the younger age group suffered from higher levels of depression, anxiety, and somatization compared to the older age group. The middle age group suffered from elevated levels of anxiety and somatization compared to the older age group. Although the older age group was the most vulnerable to the coronavirus, in this study age was found to be a protective factor from psychological distress. The results of the study suggest the need to consider the younger age group as a risk group, which hence needs to be addressed as the focus of intervention programs. It appears that the concern for their loved ones takes a heavy toll on the younger generation, and this should be considered a major source of stress.

**Keywords:** coronavirus, psychological distress, age, coping, resilience



## INTRODUCTION

The 2019 Coronavirus (COVID-19) pandemic caught the whole world “off guard.” It first emerged in late December 2019 in Wuhan, China, and spread nationwide between December 2019 and early 2020 (1). On January 30, 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a public health emergency of international concern. Israel was not spared. On January 30, Israel banned all flights from China, expanding this 2 weeks later to include more Asian countries. On March 12 all universities, schools, and kindergartens were closed, switching to remote study methods. On March 19, Israeli Prime Minister Benjamin Netanyahu declared a national emergency. Israelis were not allowed to leave their homes, unless absolutely necessary. Excluding essential services (food shops, pharmacies, and banks), which remained open, everything was closed. The restrictions were toughened during the days leading up to the closure, which was a prohibition on leaving one’s house for a distance of more than 100 m, meetings with others who do not live in the same household, and so on. The national unemployment rate rose from 3.4 to 27% in April. Mandatory face masks outside the home was introduced on April 12, and the restrictions were gradually lifted from April 19 until the Israeli economy resumed its routine.

The current study was conducted during the peak of the closure, from March 30 to April 8. At this time there was a real concern that the pandemic would get out of hand and Prime Minister Benjamin Netanyahu, together with the Ministry of Health and its Director General appeared on television almost every evening in order to explain the severity of the pandemic and warned of a forecast of thousands of casualties and tens of thousands inflicted if the closure would not be maintained. The concern that it would not be possible to provide a medical response and that the crisis was threatening to overwhelm the Israeli healthcare system was reiterated. The rate of those diagnosed with Coronavirus rose from 4,695 cases on March 30 to 9,404 by April 8, and the number of deaths rose from 12 on March 30 to 73 on April 8.

Israeli society is used to coping with crisis situations that include war and security threats, but Israel last coped with a pandemic event of global dimensions in the 1950s, in the case of the polio pandemic.

Research on how Israelis cope with security threats indicates processes of habituation after periods of tension and anxiety (2, 3). These processes were observed both in mental and physical contexts. For example, Levav et al. (4) examined health service use among the general population in response to terrorism. They found that, with few exceptions, the residents did not seek increased help from psychiatric services during the study period. In another study, Ponizovsky et al. (5) looked at the association between psychological distress and mortality. Supporting their assumption that Israelis are conditioned to adjust to these life stresses, they found that exposure to security threats (i.e., war, combat, and terror) had no association with overall mortality or cause-specific mortality.

Nonetheless, the coping of Israeli society with a non-security threat with features of a pandemic, such as the situation formed

following exposure to COVID-19, has hardly been studied [e.g., (6, 7)]. Hence, the purpose of the current study is to examine psychological distress, coping processes, and resilience of Israeli society at the height of the pandemic and of the period of social restrictions.

A review of 24 studies documenting the psychological impact of quarantine (“the separation and restriction of movement of people who have potentially been exposed to a contagious disease,” p. 912) was carried out by Brooks et al. (8). The studies were conducted across 10 countries and included people with SARS (11 studies), Ebola (five), the 2009 and 2010 H1N1 influenza pandemic (three), Middle East respiratory syndrome (two), and equine influenza (one). One of these studies related to both H1N1 and SARS. Most studies reviewed reported negative psychological effects, including symptoms of psychological stress, anxiety, insomnia, anger, irritability, emotional exhaustion, depression, and post-trauma. Stressors also included longer quarantine duration, infection fears, frustration, boredom, inadequate supplies, inadequate information, financial loss, and stigma.

Research-based evidence on the mental health effects of the current pandemic began to arrive particularly from several studies conducted in China, where the pandemic began, as stated (1, 9). The first nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic was conducted by Qiu et al. (1). They found that almost 35% ( $N = 52,730$ ) of the respondents experienced psychological distress, with significantly higher psychological distress among women and among individuals between 18 and 30 years of age or above 60. Going forward, a systematic review conducted by Xiong et al. (10) shows that although early studies from China documented higher distress among older adults, later studies from Western countries usually found lower rates of distress among older adults relative to other age groups. Similar findings were also found among Israeli older adults (7).

However, studies suggest that exposure to stressful life events retains a stable equilibrium without reactive psychopathology. A consistent body of research suggests that a majority of those who were exposed to stressful and traumatic events retain a stable equilibrium without reactive psychopathology (11, 12). The growing focus on health promotion and well-being, shifting emphasis away from pathogenic to salutogenic factors provides an opportunity to examine the role of resilience and the coping strategies in health.

Different operational definitions and corresponding methodology for measuring resilience have been offered (13). Connor and Davidson (14) define resilience as a personality trait that embodies the personal qualities that enable one to thrive in the face of adversity. In other words, it is a set of protective factors (e.g., close relationships with family and community, optimistic outlook, embracing challenges) allows an individual to have a positive response to adverse events (14). Reference to resilience as a personality trait is expressed in the questionnaire authored by them, named *The Connor–Davidson Resilience Scale* (14) that is used in this study, as well as in others [e.g., (15)]. Research findings note that trait resilience is a relatively stable personality feature (16), that was found to be associated with

lower levels of distress (e.g., depression, anxiety, sleep disorders, and PTSD) and better physical and mental health (12, 14, 16, 17).

Resilience has been associated with coping strategies, in the context of adverse events (18). In the current study, we use the notion proposed by Lazarus and Folkman (19, 20) that coping strategies are cognitive and behavioral efforts to manage specific external and/or internal demands appraised as taxing or exceeding the resources of the person dealing with stressful situations and events. Coping strategies may yield either positive or negative results. They were found to be an important feature, which moderates the association between exposure to stress and mental health in various contexts (21, 22). Lazarus and Folkman (19) suggested two major forms of coping: problem-focused (dealing with stress sources and taking proactive steps to change them) or emotion-focused (serving to reduce the emotional stress resulting from such situations) [See also: (23)].

Use of problem-focused strategies usually shows more negative correlations with distress, and indicates good mental health (24, 25) and higher levels of resilience (22, 26). In contrast, greater use of emotion-focused coping is highly correlated with high levels of psychological distress [e.g., (24, 27–29)].

However, the distribution of coping strategies is not so dichotomous (30). Several studies have shown that both coping strategies were positively correlated with pathogenic (e.g., PTS symptoms) as well as with salutogenic factors (e.g., resilience, post traumatic growth) (3, 22). It was also found that emotion-focused strategies may also be beneficial in situations perceived as uncontrollable or in the absence of a viable solution (e.g., terrorism exposure and security threats) (31–34). In these cases, it even might be better to use emotion-focused coping, since this strategy may reduce the negative psychological effects of the scenario/event without confronting it directly (30).

The Coronavirus revealed different risk levels for different age groups, with a higher risk for people aged 60 or older. Studies on nation-wide populations indicate that age is a major factor in addressing mental health outcomes (35). Therefore, in the current study we aim to examine the levels of psychological distress and concern about health and financial situation during this special period among different age groups, as well as the relations to resilience and coping strategies across ages and for specific age groups. Three age groups were examined: older adults (60+), middle group (59–30), and younger (22–33). The age groups were selected based on former studies that utilized similar age group examinations of mental health outcomes (1, 35).

We hypothesized that participants would report high concerns for their own and their families' health regarding the COVID-19 pandemic, as well as high concerns for the financial implications of the COVID-19 pandemic. Furthermore, we hypothesized that a higher level of health concerns and psychological distress would be reported by the older adults age group compared with the other age groups, since this age group was at the highest risk of dying after contracting the virus. Finally, negative correlations were hypothesized between the level of psychological distress, and resilience and problem-focused coping, and a positive correlation between level of distress and emotion-focused coping.

## METHOD

### Participants

Nine hundred and twenty-five participants took part in the study. They were divided into three groups: younger, aged 18–29,  $N = 189$  (20.4%); middle, aged 30–59,  $N = 473$  (51.1%), and older adults, aged 60–88,  $N = 263$  (28.4). Most of the respondents in the middle aged and older adults groups had children (90.3 and 97%, respectively). Only 13.8% of the younger group had children. Among those with children, they had up to 11 children, with a greater number of children in the older adults group ( $M = 3.05$ ,  $SD = 1.18$ ) than in the middle aged group ( $M = 2.73$ ,  $SD = 1.42$ ), with the younger group having the fewest children ( $M = 0.35$ ,  $SD = 0.082$ ) ( $F_{(2,854)} = 223.70$ ,  $\eta^2 = 0.344$ ,  $p < 0.001$ ).

As seen in **Table 1**, there were 71% females, with no meaningful gender differences by age group. Most participants in the middle age and older adults groups were married or in a steady relationship (about 80%), while most participants in the younger group were single (61%), a significant difference. Most respondents had an academic education, yet to a higher extent in the middle aged group (75%) than in the younger (60%) or older groups (57%).

### Measurements

#### Personal Data

Data were gathered regarding gender, age, religiosity, level of education, number of children, age of youngest child, type of residential town, residential region.

#### Coronavirus Objective and Subjective Exposure

This measure was devised for the current study. Questions were asked regarding the current time—during closure due to COVID-19. Did you contract the Coronavirus? Were you admitted to a hospital or quarantined at home because you were ill with the virus? Did someone from your family contract the Coronavirus? Did you continue working during the closure? Who is currently at home with you?

Three additional questions related to respondents' degree of concern during this period. Participants were asked to rate on a 5-point scale (1 = not at all to 5 = very much): How concerned are they that their health will be affected due to contracting the Coronavirus? How concerned are they that their family members will be affected by contracting the Coronavirus? And how concerned are they about their financial situation due to the Coronavirus crisis?

#### Coping Strategies: Measured by the COPE Scale (36)

The scale assesses two major coping strategies: problem-focused (15 items) and emotion-focused (15 items). The scale has been used extensively in Hebrew [e.g., (27, 37)]. Participants were asked to rate the extent to which they used each coping option to deal with the stressful situations caused by the COVID-19 pandemic, on a 4-point scale (0 = not at all; 3 = a great deal) (data were transformed into a 1–4 scale). In the current study, internal consistency was 0.78 for problem-focused and 0.73 for emotion-focused coping.

**TABLE 1** | Distribution of background variables by age group ( $N = 925$ ).

		Total sample N (%)	Young N (%)	Middle N (%)	Older adults N (%)	Difference
Gender	Male	268 (29.0)	60 (31.7)	118 (24.9)	90 (34.2)	$\chi^2(2) = 7.95$ ( $p = 0.019$ )
	Female	657 (71.0)	129 (68.3)	355 (75.1)	173 (65.8)	
Family status	Married, in a relationship	656 (71.0)	70 (37.2)	373 (78.9)	213 (81.0)	$\chi^2(2) = 131.02$ ( $p < 0.001$ )
	Other (single, divorce, widower)	268 (29.0)	118 (62.8)	100 (21.1)	50 (19.0)	
Education	Secondary	194 (21.0)	63 (33.3)	66 (14.0)	65 (24.8)	$\chi^2(4) = 48.95$ ( $p < 0.001$ )
	Vocational	114 (12.4)	13 (6.9)	53 (11.2)	48 (18.3)	
	Academic	615 (66.6)	113 (59.8)	353 (74.8)	149 (56.9)	

The Bonferroni correction for multiple comparisons yields  $p = 0.017$ .

## Resilience

This measure was examined by the Connor-Davidson Resilience Scale (CD-RISC; 10), which consists of 25 statements (e.g., *able to adapt when changes occur; have close and secure relationships; belief one can deal with whatever comes and having control of one's life*). Each statement is rated by respondents in terms of the extent of their agreement with it over the previous month (0 = not at all to 4 = true nearly all the time). This scale has been used among the Israeli population and has shown good predictive validity and internal consistency (15, 22). Total CD-RISC scores representative of resilience were utilized for this study ( $\alpha = 0.89$ ).

## Psychological Symptoms

Psychological symptoms were assessed using the BSI-18 (38), which is a self-report symptom checklist measure consisting of 18 items taken from the 53-item Brief Symptom Inventory [BSI; (39)]. Each BSI-18 item describes a symptom to be rated by respondents on a five-point scale according to how much they were bothered by the symptom in the previous week. Scores on the 18 items are summarized on the Global Severity Index (GSI) ( $\alpha = 0.92$ ) and regarding three symptom scales: Somatization ( $\alpha = 0.82$ ), Depression ( $\alpha = 0.82$ ), and Anxiety ( $\alpha = 0.86$ ), each comprising six items.

## Procedure

For collecting the data, we used a cross-sectional anonymous online questionnaire. The data was collected between March 31 and April 8, 2020, a time when the Israeli government had issued a directive for citizens to isolate themselves at home and minimize face-to-face interaction. Thus, potential respondents were electronically invited by existing research respondents. The participants completed the questionnaires through an online survey platform. Then the raw data was transferred into a database. The online questionnaire offered the necessary assurances of anonymity to allow respondents to give accurate data surrounding sensitive issues, which is particularly relevant in the field of mental health. All respondents provided informed consent. The study was approved by the ethical standards of the Institutional Review Board (IRB) of the University.

## Data Analysis

Data were analyzed with SPSS v. 26. Internal consistencies were calculated for the research variables, and the research variables were computed with item means or sums. As BSI scores were positively skewed they were log transformed. Background characteristics of the respondents were described with means and standard deviations for continuous variables and frequencies and percentages for categorical variables. The three age groups were compared through analyses of variance and chi-squares, respectively. Means, standard deviations, and intercorrelations for the research variables were described. Analyses of variance with *post-hoc* estimated marginal means with the Bonferroni correction for multiple comparisons were calculated to compare the research variables across the three age groups. A multiple hierarchical regression for the total BSI score with the research variables was calculated. The first step included gender (1-males, 0-females) and the age groups (entered as two dichotomous variables: younger vs. others, and older adults vs. others). The second step included the variables of concerns, coping strategies, and the total score for resiliency. The Bonferroni correction for multiple comparisons was applied in all tables.

## RESULTS

### Coronavirus Objective and Subjective Exposure

Only one participant had contracted the virus and remained at home. Only 10 family members of the respondents (1.1%) had contracted COVID-19. **Table 2** presents the differences between the groups in objective and subjective exposure.

Participants in the three groups were mainly living with family or with their spouse during the COVID-19 epidemic. Of those who had been employed, about 43% had to stop working. Their rate was highest in the older adults group (58%), lower in the younger group (49%), and lowest in the middle aged group (35%). Most respondents had an academic education, yet to a higher extent in the middle aged group (75%) than in younger (60%) and older groups (57%).

Examination of levels of concern showed that participants were moderately concerned about their own health ( $M = 2.70$ )

**TABLE 2** | Distribution of objective and subjective exposure by age group ( $N = 925$ ).

		Total sample N (%)	Young N (%)	Middle N (%)	Older adults N (%)	Difference
Lives with (at present)	Alone	91 (9.9)	20 (10.6)	33 (7.0)	38 (14.6)	$\chi^2(2) = 10.83$ ( $p = 0.004$ )
	Family and mate	828 (90.1)	168 (89.4)	437 (93.0)	223 (85.4)	
Employment during Coronavirus	Yes- works	464 (56.9)	94 (50.8)	299 (64.9)	71 (41.8)	$\chi^2(2) = 3.58$ ( $p < 0.001$ )
	No- stopped	352 (43.1)	91 (49.2)	162 (35.1)	99 (58.2)	
	Range	M (SD)	M (SD)	M (SD)	M (SD)	
Concerned about own health	1-5	2.70 (1.16)	2.59 (1.15)	2.69 (1.17)	2.81 (1.14)	$F_{(2,919)} = 1.98$ ( $p = 0.139$ ), ( $\eta^2 = 0.004$ )
Concerned about family health	1-5	3.56 (1.14)	4.08 (0.98)	3.49 (1.15)	3.32 (1.12)	$F_{(2,920)} = 28.32$ ( $p < 0.001$ ), ( $\eta^2 = 0.058$ ) 1 > 2, 3
Concerned about financial status	1-5	2.73 (1.24)	2.84 (1.33)	2.78 (1.21)	2.58 (1.20)	$F_{(2,919)} = 2.68$ ( $p = 0.069$ ), ( $\eta^2 = 0.006$ )

The Bonferroni correction for multiple comparisons yields  $p = 0.010$ .

with no significant group difference. They were more concerned about their family's health ( $M = 3.56$ ) than about their own health ( $t_{(923)} = 26.62$ ,  $p < 0.001$ ). Concern for the family's health was highest among the younger participants ( $M = 4.08$ ), and lower among both middle aged ( $M = 3.49$ ) and older adult ( $M = 3.32$ ) participants. Further, the participants were moderately concerned about their financial state ( $M = 2.73$ ), with no significant age group differences. Concern about family members' health was the highest, compared to both concerns about own health and about participants' financial status ( $F_{(2,1840)} = 295.40$ ,  $p < 0.001$ ,  $\eta^2 = 0.243$ ). Further, the interaction between the type of concern and age group was significant ( $F_{(4,1840)} = 19.81$ ,  $p < 0.001$ ,  $\eta^2 = 0.041$ ). Interpretation revealed that for the younger group concern about the family's health was highest, then financial concerns ( $p < 0.001$ ), and lowest was the concern about their own health ( $p = 0.034$ ). In the middle aged group, concern about the family's health was higher than both financial concerns and the concern for their own health ( $p < 0.001$ ). In the older adults group, concern about the family's health was highest, followed by concerns about their own health ( $p < 0.001$ ), and lowest was financial concerns ( $p < 0.001$ ).

## Intercorrelations for the Research Variables

**Table 3** presents means, standard deviations, and intercorrelations for the research variables. Problem focused coping was moderate low, and emotion focused coping was lower ( $t_{(923)} = 21.38$ ,  $p < 0.001$ ). Resiliency was moderate high, and all BSI mean scores were low.

Significant correlations were found among the research variables. Problem focused coping was positively related with emotion focused coping, resiliency, and all BSI scores. Emotion focused coping was positively related with all BSI scores as well. Resiliency was negatively related with the BSI scores.

**Table 4** presents group differences in the research variables, controlling for gender (1-male, 0-female) and education level (1-academic, 0-less than academic). Family status was not controlled for, as it had too low a variance in two of the three groups and was thus group specific.

Problem focused coping was generally moderate low and was higher among the middle aged group than among the older adults group. Emotion focused coping was generally low and did not differ by group. Problem focused coping was generally higher than emotion focused coping ( $F_{(1,921)} = 364.40$ ,  $p < 0.001$ ,  $\eta^2 = 0.283$ ). Further, the interaction between coping style and age group was significant ( $F_{(2,921)} = 9.41$ ,  $p < 0.001$ ,  $\eta^2 = 0.020$ ). Interpretation revealed that in all age groups problem focused coping was higher than emotion focused coping, yet to a greater extent in the middle aged group ( $\eta^2 = 0.264$ ), than in the younger ( $\eta^2 = 0.088$ ) and older ( $\eta^2 = 0.067$ ) groups.

Resiliency was moderate-high and did not differ by age group. BSI mean scores were low. The total score, somatization, and anxiety were highest among the younger group, lower among the middle aged group, and lowest among the older adults group. Depression was higher among the younger group than among the middle aged and older adults groups.

## Regression

In order to assess the relationship between distress (total BSI score) and the research variables, we conducted a multiple hierarchical regression. **Table 5** presents a multiple hierarchical regression for the total BSI score. The first step included gender (1-males, 0-females) and the age groups (entered as two dichotomous variables: younger group vs. others, and older adults group vs. others) (education level was not entered as it was unrelated to distress-  $r = -0.01$ ,  $p = 0.796$ ). The second step included the research variables of concerns, coping strategies, and the total score for resiliency.



**TABLE 3** | Means, standard deviations, and intercorrelations for the research variables ( $N = 925$ ).

	<b>M (SD)</b>	<b>2.</b>	<b>3.</b>	<b>4.</b>	<b>5.</b>	<b>6.</b>	<b>7.</b>
1. Coping: problem (0–3)	1.35 (0.55)	0.51***	0.16***	0.27***	0.16***	0.33***	0.18***
2. Coping: emotion (0–3)	1.01 (0.36)		−0.01	0.43***	0.30***	0.44***	0.35***
3. Resiliency: total (0–100)	67.39 (13.32)			−0.34***	−0.24***	−0.29***	−0.36***
4. BSI- total score (0–4)	0.54 (0.51)				0.80***	0.93***	0.88***
5. BSI- somatization (0–4)	0.29 (0.47)					0.66***	0.55***
6. BSI- anxiety (0–4)	0.78 (0.68)						0.71***
7. BSI- depression (0–4)	0.57 (0.59)						

\*\*\* $p < 0.001$ .

The Bonferroni correction for multiple comparisons yields  $p = 0.002$ .

**TABLE 4** | Distribution of the research variables by age group ( $N = 925$ ).

	<b>Range</b>	<b>Total sample M (SD)</b>	<b>Young M (SD)</b>	<b>Middle M (SD)</b>	<b>Older adults M (SD)</b>	<b>Difference</b>	
Coping- problem focused	0–3	1.35 (0.55)	1.34 (0.53)	1.43 (0.54)	1.22 (0.54)	$F_{(2,919)} = 7.07$ ( $p < 0.001$ ) ( $\eta^2 = 0.025$ )	2 > 3
Coping- emotion focused	0–3	1.01 (0.36)	1.01 (0.32)	1.03 (0.38)	0.99 (0.35)	$F_{(2,919)} = 0.63$ ( $p = 0.534$ ) ( $\eta^2 = 0.001$ )	—
Resiliency- total score	0–100	67.39 (13.32)	67.68 (12.52)	67.70 (13.48)	66.61 (13.6)	$F_{(2,915)} = 0.48$ ( $p = 0.618$ ) ( $\eta^2 = 0.001$ )	—
BSI- total score	0–4	0.54 (0.51)	0.73 (0.63)	0.54 (0.50)	0.42 (0.39)	$F_{(2,908)} = 20.80$ ( $p < 0.001$ ) ( $\eta^2 = 0.044$ )	1 > 2 > 3
BSI- somatization	0–4	0.29 (0.47)	0.40 (0.57)	0.29 (0.46)	0.20 (0.38)	$F_{(2,908)} = 10.36$ ( $p < 0.001$ ) ( $\eta^2 = 0.022$ )	1 > 2 > 3
BSI- anxiety	0–4	0.78 (0.68)	0.95 (0.78)	0.81 (0.70)	0.60 (0.52)	$F_{(2,908)} = 14.36$ ( $p < 0.001$ ) ( $\eta^2 = 0.031$ )	1 > 2 > 3
BSI- depression	0–4	0.57 (0.59)	0.84 (0.76)	0.52 (0.53)	0.45 (0.49)	$F_{(2,908)} = 24.62$ ( $p < 0.001$ ) ( $\eta^2 = 0.051$ )	1 > 2, 3

The Bonferroni correction for multiple comparisons yields  $p = 0.007$ .

The regression model was found to be significant, with 38% of the variance explained by the total BSI score. Gender and age group were found significant, showing higher levels of psychological distress among women than men, and among the younger age group than the other groups. Higher levels of concern about the financial status was related to higher psychological distress. Greater use of emotion focused coping, as well as greater use of problem focused coping, were related to higher psychological distress. Finally, lower levels of resiliency were related to higher psychological distress as well.

## DISCUSSION

The study was conducted at the peak of the lockdown, at a time when there was a real concern that the pandemic

would get out of hand. The COVID-19 crisis had received unprecedented levels of documentation and publicity around the world. For weeks, almost every media source (newspapers, television, radio, internet) had back-to-back coverage of the coronavirus pandemic, reporting the numbers of those infected and dead and presenting frightening statistics about the hundreds and thousands of people who had died daily. Our aims were to examine psychological distress and concerns about health and about the financial implications during this unique period among different age groups. Another aim was to explore the relationship between resilience and coping on one hand and psychological distress on the other.

The research findings indicate differences between and within the groups with regard to the three types of concern explored: concern of contracting the virus, concern that a family member would contract the virus, and concern of

**TABLE 5 |** Multiple hierarchical regression for the total BSI score ( $N = 925$ ).

	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>
<b>Step 1</b>				
Gender	-0.14	0.02	-0.22	<0.001
Age group- younger	0.11	0.02	0.15	<0.001
Age group- older adults	-0.06	0.02	-0.09	0.007
Adj. $R^2$	0.09			
<b>Step 2</b>				
Gender	-0.05	0.02	-0.09	0.002
Age group- younger	0.11	0.02	0.15	<0.001
Age group- older adults	-0.04	0.02	-0.07	0.014
Concern about own health	0.02	0.01	0.06	0.086
Concern about family's health	0.01	0.01	0.05	0.171
Concern about financial status	0.03	0.01	0.12	<0.001
Coping- problem focused	0.05	0.02	0.10	0.002
Coping- emotion focused	0.24	0.02	0.31	<0.001
Resiliency- total score	-0.01	0.01	-0.33	<0.001
Adj. $R^2$	0.38			

$F_{(9,915)} = 64.02, p < 0.001$ .

The Bonferroni correction for multiple comparisons yields  $p = 0.005$ .

the financial implications. Most of the respondents expressed concern particularly with regard to their family and less regarding the financial situation. The former concern was particularly high (4.08 on a scale of 1 to 5) among the younger group, consisting of those under 30. Although this was the main concern, the regression findings indicate that it was the financial concern that was found to be associated with the respondents' level of distress.

The fact that financial concerns and not concern for the family's health was associated with psychological distress can be explained by the Israeli reality at the time the study was conducted. Most of the participants in the three groups were living with family or with their spouse at the time of this study. Israeli citizens were asked to remain at home and were in fact in a state of lockdown that protected them from contracting the virus. Indeed, as evident from the participants' reports, only one participant had contracted the virus and remained at home and only 10 family members of the participants (1.1%) had contracted COVID-19. The most significant effect of the coronavirus was the need to stop working and to remain at home during the lockdown, with no knowledge of when and even whether they would return to their jobs. Most of the government efforts were directed at preventing the pandemic from spreading and, at least in the first stage when the study was conducted, less government attention was given to the financial implications.

In our estimate the high unemployment rates following the crisis, side by side with the focus on health-related means of protection, explain how considering the lockdown and the government focus on obtaining hospital equipment the citizens felt relatively protected from a health perspective and that the government was making efforts to protect them from contracting and dying from the virus. In contrast, it was the lockdown and cessation of work, as well as the lack of government clarifications regarding the financial steps that would be taken, that led to

increasing concern of the financial implications. The post-study Israeli reality, evident at the time these lines are being written (mid-May 2020), reinforces this assumption. Despite the easing of the lockdown and the approval given to return to work, many citizens have lost their jobs and the unemployment rate is high, indicating distress that is currently manifested in protests and demonstrations against the government, in a request for massive financial assistance for those whose source of subsistence was affected by the pandemic. The association found between psychological distress and financial concerns certainly appears to indicate real distress. A similar association was found by Qiu et al. (1) who explained the high psychological distress found among Chinese citizens by concerns about delays in work time and subsequent deprivation of their anticipated income, possibly explaining the high stress level.

In contrast to the hypothesis whereby adults over 60 would report higher psychological distress than others, the current findings show that they displayed the lowest levels of distress while the younger group displayed the highest levels. Consistent with these results, previous studies have found lower reactivity to stress in older adults due to the COVID-19 pandemic [e.g., (7, 40)].

We assumed that the information publicized whereby the older adults group have the highest risk and the younger group, even if contracting the virus, are not at risk of death, as well as the reports of the very high death rates among older adults, would lead to higher distress among the older adults group compared to the younger group. Similar assumptions led to different findings in a study held in China also during the peak of the lockdown (1), where high levels of distress were found among both the older adult and younger groups. The Chinese researchers explained the high level of distress among the older adults group as due to the fact that the highest mortality rate during the epidemic occurred among older adults, adding that psychological distress levels were also influenced by the availability of local medical resources, the efficiency of the regional public health system, and prevention and control measures taken against the epidemic situation.

These explanations do not seem to have been compatible with the Israeli circumstances during the crisis. While particularly high death rates were reported in China, in Israel the death rate was very low, as was the rate of those infected. In Israel, the health system dealt with the cases discovered very successfully and managed to prevent an outbreak of the pandemic.

Another possible explanation is related to the attention and high level of care directed at older adults, both by the media and various aid organizations and by their families. Caring for older adults was emphasized in all possible media, side by side with warnings and instructions to protect mainly older adults who constitute a risk group, where the sentence "Protect grandpa and grandma—Keep a distance" became a popular motto. The media was flooded with photographic evidence showing that despite the physical isolation and the prohibition of contact between older adults and their family members, strong daily contact was maintained between them by digital means (Zoom, WhatsApp, etc.). The considerable social support provided to this age group might have moderated their sense of distress and loneliness. The association between social and family support has been found

to be a moderator of distress and a factor that helps cope with crisis situations (22, 41). Family and personal resources seem to be relevant for explaining loneliness and psychological well-being during a critical stressful period (40). Therefore, it may be that although the oldest age group had the highest risk to their physical health, they were more capable of dealing with the psychological distress that accompanied the coronavirus.

Returning to the younger group, as mentioned above younger participants were found to have the highest levels of psychological distress compared to the other age groups. Similar findings regarding young participants were found among the Chinese during the pandemic (1). The researchers explain this finding by the fact that this age group is highly interested in the media and therefore obtain more information that may result in their higher susceptibility. Other explanations may be related to the respondents' age and not necessarily to exposure to the media, as the latter was true of all ages. The higher levels of distress and concern among this age group may be due to their younger age, which meant that they had limited previous exposure to new stressors. Thus, while in the older adults age group their long life experience granted them the ability to manage new stressors, this was not so among the younger group. Support for this assumption came from other findings showing that mental health disorders are more frequent and apparent in younger age groups, and unlike physical disorders they tend to decrease as the individual matures (35). For example, in a study conducted in Singapore following the acute respiratory syndrome (SARS) epidemic (42), greater anxiety was associated with younger age. The researchers' assumption was that this is related to differences in coping styles among younger individuals.

Examination of the differences in resilience between the age groups revealed no difference in the use of resilience and that resilience was moderate high and negatively associated with psychological distress. The fact that resilience had similar distribution across age group is in line with Connor and Davidson (14) perception of resilience as a personality trait and not the result of confronting previous life experiences. The negative association between resilience and psychological distress is in line with studies indicating that resilience protects individuals from the deleterious effects of exposure to stress and trauma (13, 16).

With respect to the findings regarding coping strategies, we found more use of problem-focused coping than of emotion-focused coping, unrelated to age. This finding is indicative of a healthy coping style. The greater use of problem-focused coping in the middle age group specifically is also understandable. This age group has a greater need to cope with the reality of being at home with young children, compared to the younger group (most of whom have no children) and the older adults group.

The positive association between use of problem-focused coping and resilience supports these explanations. Resilient individuals have been found to employ greater amounts of active coping such as problem-focused coping (26). While resilience allows an individual to respond positively to adverse events (14), coping strategies may yield either positive or negative results.

As hypothesized and in line with the literature, greater use of emotion-focused coping was related to higher psychological distress (24, 28). However, the positive association between problem focused coping and psychological distress needs to be addressed. This finding contradicts research findings that indicate a reverse association between distress and problem focused coping (24, 25). However, several studies have shown that both coping strategies were positively correlated with pathogenic (e.g., PTS symptoms) as well as with salutogenic factors (e.g., resilience, post traumatic growth) (3, 22).

It was also found that emotion-focused strategies may be beneficial in situations perceived as uncontrollable or in the absence of a viable solution (e.g., exposure to terrorism and security threats) (31–34). In these cases, it may even be better to use emotion-focused coping, since this strategy may reduce the negative psychological effects of the scenario/event without confronting it directly (30). The pandemic studied here certainly fits the definition of an event perceived as uncontrollable or lacking a viable solution. It is logical for participants to use emotional (e.g., concerns about health as well as about one's financial situation) in conjunction with practical coping strategies (e.g., attempts to protect themselves as well as their family).

Finally, although at the time the study was conducted there was no indication that the coronavirus acted differently among men and women, the findings show that women had higher levels of psychological distress compared to men. This is in line with previous findings showing that women appear to be more vulnerable to internalizing symptoms, both in studies on the coronavirus (1) as well as in national studies on psychological distress levels (35, 43, 44). This tendency is well-documented and has been attributed to physiological differences (45), differences in cognitive appraisal and coping (46), socialization, and social factors (47).

To sum, due to the unusual nature of the research subject, the current study can be seen as exploratory. Psychological and coping responses following infectious disease outbreaks are relatively understudied. Thus, the findings should be approached with appropriate caution. In addition, our online survey sampling method has its benefits and drawbacks. As for the former, online surveys allow for faster data collection and access to a potentially more diverse pool of participants. However, for the latter, some degree of potential sample bias should be taken into account. This strategy was not based on a random selection of the sample, and the study population did not reflect the actual pattern of the general population. In addition, there was no measurement of prepandemic of the variables we measured in the current study. Thus, It is possible that differences reflect pre-pandemic patterns.

Online surveys can reach only those who are online and those who agree to be part of the panel, and not all those who are invited to respond. In addition, our results rely on self-report questionnaires. Self-reported levels of psychological impact may not always be aligned with assessment by mental health professionals (48). Although this type of research design

is generally a reliable source for gathering information about people's experiences, including regarding exposure to stressful events (1, 3), a multi-informant paradigm could enhance the data. Finally, only a single participant had contracted the virus. Thus, the findings could not be generalized to confirmed or suspected cases of COVID-19. However, in a time of crisis such as the current COVID-19 pandemic, there is a need to rapidly develop ways to better detect and classify those at greatest risk (49).

Overall, the research results indicate that although the coronavirus posed a higher psychological risk for older adults, it seems that this age group was better able to cope with its psychological effects, at least in Israel where the number of those infected was low. Qiu et al. (1) indicate that in regions where there seem to be better medical resources and control measures were taken against the pandemic, psychological distress was lower. We assume that knowledge that medical staff and resources in Israel are known to be on a high standard and about the drastic steps that were taken almost from the beginning of the coronavirus spread, resulted in the low psychological distress levels found among all age groups in the current study and especially among older adults. However, in the current study we have examined age as an objective variable. It may be that age should also be considered as a subjective perceived factor, which was found to be related to the mental health of older adults during the COVID-19 pandemic (50). Finally, the results of the study suggest the need to consider the younger age group as a risk group, and this needs to be addressed as the focus of an intervention program.

In 1919, following the influenza pandemic, Soper (51) wrote a paper that was published in *Science*, describing the feelings aroused by the flu:

“The pandemic which has just swept round the earth has been without precedent... never before has there been a catastrophe at once so sudden, so devastating and so universal. The most astonishing thing about the pandemic was the complete mystery which surrounded it... Nobody seemed to know what the disease was, where it came from or how to stop it. Anxious

minds are inquiring to-day whether another wave of it will come again... Nobody can now speak authoritatively upon this subject.... (p. 501)”.

Although a century has passed, the description also fits the COVID-19 crisis. Despite the relatively low rates of distress found among participants in Israel, findings from other countries (such as China) indicate extreme rates of distress and many are still in a state of uncertainty.

Any major epidemic outbreak has negative effects on individuals and on society. No country alone can prevent a global risk such as COVID-19. This shows the importance of pre-establishing community coalitions to mobilize resources efficiently and effectively and to respond successfully to the disaster-related mental health needs of affected individuals and raises the need for developing practical community mental health programs for future infectious disease outbreaks.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The study was approved by the ethical standards of the Institutional Review Board (IRB) of Ariel University, Israel. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MS and AL contributed to conception and design of the study and manuscript writing, revision, and approved the submitted version. MS led questionnaire development and organized the database.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Goals and Self-Efficacy Beliefs During the Initial COVID-19 Lockdown: A Mixed Methods Analysis

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This study aimed to capture how the coronavirus disease 2019 (COVID-19) crisis disrupted and affected individuals' goal pursuits and self-efficacy beliefs early during the lockdown phase of COVID-19. Participants impacted by lockdown regulations accessed an online questionnaire during a 10-day window from the end of March to early April 2020 and reported a significant personal goal toward which they had been working, and then completed quantitative and qualitative survey items tapping self-efficacy beliefs for goal achievement, subjective caring about the goal during disrupted world events, and current pursuit or abandonment of the goal. The findings from both quantitative and qualitative measures demonstrated a significant drop in self-efficacy beliefs from before to during the pandemic with a large effect based on whether people thought they could still achieve their goal under current conditions. Over two-thirds of the sample was unsure or did not believe they could still carry out their goal, and over a quarter either abandoned or were uncertain they could pursue the goal. Despite this, people continued to care about their goals. Reasons for abandonment and strategies for coping with goals within the lockdown and beyond are discussed.

**Keywords:** goals, self-efficacy, COVID-19, coping, social psychology, lockdown, projects

## INTRODUCTION

Goals give meaning to life. People experience greater well-being and a higher sense of fulfillment when their days include activities structured by, and directed toward, personally significant aims (Sheldon and Elliot, 1999; Emmons, 2003). Evidence from both personality/social and clinical science attests to this (e.g., Ho et al., 2010). Even individuals experiencing severe psychopathology anticipate personal well-being when envisioning a future in which they attain self-nominated personal goals (Coughlan et al., 2017).

Many significant life goals have a quality that is well-captured by the concept of “projects” (Little, 2007). Personal projects are interrelated sets of activities organized toward an overall aim (e.g., “prepare to apply to medical school,” “find a new job so I can quit this current one”). Projects not only organize everyday actions but also foster a coherent sense of self; self-concept is reflected in and developed by the pursuit of valued personal projects (Bruner, 1990; Little, 1993).

When people commit themselves to a meaningful project, they usually pursue it over a substantial period of time. For example, Langan-Fox (1991) assessed university students' personal goals at two time periods 5 months apart. As compared with an older-adult population, one might expect that such younger adults would experience instability of goals as they consider alternate personal and professional futures. Yet, among both female and male students, goal content was highly stable. Projects persist partly as a result of becoming elements of enduring "life stories," that is, narratively structured conceptions of one's life path and personal identity (McAdams, 1996). Empirically, the themes contained in personal goals and life stories are strongly related (McGregor et al., 2006).

Little (2011) emphasizes that goals are not just mental contents stored in the head. Personal strivings are fundamentally intertwined with the social contexts in which one lives. People often can sustain their pursuit of a personal goal in "the felicitous case" in which they work toward "projects that are meaningful, manageable, and supported by the eco-setting" (Little, 2011, p. 80). But what happens in the infelicitous case, when the eco-setting withdraws its support?

One answer to this question may be found in the study of goal appraisals, that is, people ongoing evaluations of their goal-directed activity. When establishing and working toward goals, people engage in strategic evaluation of their progress, using goal appraisals and aspects of self-regulation (Bembenutty et al., 2013). One major appraisal is coping capability, or appraisals of self-efficacy, (Bandura, 1977, 1986), and the unexpected disruption presented by the coronavirus disease 2019 (COVID-19) pandemic provides a particular set of globally felt conditions in which to consider people's understanding of their capabilities, through self-efficacy, and adherence to goals. The relation between self-efficacy appraisals and goal commitments can vary from one context to another, even in ordinary times. Often, self-efficacy contributes to goal setting; people are less likely to pursue goals when they doubt their capability for success (Locke and Latham, 2006; Bardach et al., 2020). However, in some contexts, people persist on goal-directed activities even in the absence of high-efficacy expectations. This occurs, for example, when goal achievement is critical to avoiding substantial personal loss (Shah and Higgins, 1997; Senko and Freund, 2015; for a meta-analytic review, see Huang, 2016) or when the goal-directed activity is an expression of personal values and the intuitive, "integrated" self (Kuhl et al., 2015).

Basic research in personality, social, and developmental psychology establishes the causal impact of self-efficacy and goal processes on social behavior and well-being. For example, in longitudinal research, self-efficacy predicts psychosocial outcomes even after accounting for the role of personality traits (Caprara et al., 2004), goal setting predicts achievement and interest in activities (Scherrer et al., 2020), and personal goals impact subjective well-being (Brunstein, 1993) which, in turn, is found to facilitate re-engagement with meaningful life goals (Haase et al., 2020). With this basic research as our background, in the present study, we sought to portray the nature of goal pursuit and self-efficacy beliefs at a uniquely disruptive moment in recent world history, namely, the early period of the social

"lockdown" necessitated by the rapid spread of COVID-19 in the early months of the year.

The worldwide disruption created by the COVID-19 pandemic has fundamentally changed people's lives physically and psychologically (Jiang, 2020; Qiu et al., 2020; Remuzzi and Remuzzi, 2020), with several studies outlining the negative psychological impact that forced quarantine can have on the population (Brooks et al., 2020), citing reductions in positive emotions, sleep disturbances, and increased feelings of anger and anxiety (Cava et al., 2005; Roy et al., 2020). The reduction in social contact and steps taken to deal with the psychological impact of this (Bzdok and Dunbar, 2020) has added a potentially significant disruption to the populations' previous goal pursuits. Goals may now yield to new challenges such as limited access to food, financial worries, sudden need for employment, the care of isolated family members, or reductions to health (Cipolletta and Ortu, 2020; Fraenkel and Cho, 2020; Wilms et al., 2020). In addition to its vast biomedical and economic costs, there likely was a psychological cost associated with the disruption of valued personal projects by imposed social and mobility restrictions. What was the nature and magnitude of that goal disruption? How did people cope with their altered life circumstances? These are questions addressed in the present report.

## MATERIALS AND METHODS

### The Present Research

We conducted a mixed-methods survey of goals, self-efficacy beliefs, and potential goal disruptions in the early period of the lockdown in the COVID-19 crisis. Three aspects of the survey are of note. The first is its conceptual basis, which was a social-cognitive orientation (Bandura, 1986), in which self-reflection on one's capabilities, the setting of goals, and self-regulatory efforts are central to emotion, motivation, and achievement (also see Sarrazin et al., 1996; Caprara et al., 2011; Zimmerman et al., 2017). Survey items focused on three classes of thoughts and feelings about self-identified projects that are consistent with this perspective: (1) self-efficacy beliefs for goal achievement (Bandura, 1997); (2) subjective caring about the goal in light of disrupted world events (a variable associated with self-evaluative reactions to those that are central to social-cognitive analyses of self-regulation; Bandura and Cervone, 1983; Cervone et al., 1991); and (3) commitment to goals, that is, whether people saw themselves as still pursuing the projects that, prior to the pandemic, had been central to their everyday lives.

A second feature is the type of survey items we included; our use of both quantitative and qualitative measures is unique within the self-efficacy literature, which has almost exclusively relied on quantitative self-ratings of people's self-efficacy appraisals. Given the utter novelty of the COVID-19 outbreak, we judged the inclusion of open-ended qualitative measures necessary for learning about people's beliefs and experience in the midst of this pandemic. Self-efficacy researchers have continued to develop and validate questionnaires to better capture the construct within a specific domain (Bandura, 2006; Bong, 2006; Ritchie and Williamon, 2011; Axboe et al., 2016); however, the need

for a qualitative approach that moves beyond the traditional questionnaire has been suggested (Ritchie, *in press*), but no studies to date have investigated the possible comparability of qualitative and quantitative methods.

Allowing participants to speak, in their own terms, about their goals, experiences, and coping strategies enabled us to explore both the phenomenology of engagement, motivation, and processes of personal agency while navigating iterative and unforeseen challenges toward achievement. Given the mixed-methods data source, we report quantitative analyses, human-based coding of narrative text, and computational natural language processing of syntax and sentiment in that text.

The third aspect of the survey was practical. Early in a pandemic, people have a lot to do other than filling out surveys. We focused our survey exclusively on the set of variables (described above) of maximal interest, in an effort to maintain clarity while eliciting full free-text responses that captured a sense of the person, their outlook, and their investment in the goal. We also deliberately constrained the time frame of survey administration to relatively narrow time window early in the COVID-19 lockdown period when lifestyle changes were newly imposed and still unfolding. Previously, “normal” life was still within recent experience, allowing a snapshot of comparative outlooks. Had we allowed the data collection period to extend, there was a risk that people would begin to develop a catalog of adaptive behaviors in light of these new conditions. Our goal was to gain insight into people’s efforts to sustain their projects at the onset of this dramatically challenging moment in history.

## Participants

The participants ( $n = 161$ ) were aged 19–80 years,  $M = 45.70$  ( $SD = 14.86$ ), and lived in the United Kingdom ( $n = 101$ ), the United States ( $n = 31$ ), and 11 other countries ( $n = 23$ ) across five continents. Six individuals chose not to declare their location. On an 11-point bipolar measure of gender identity, 56 participants identified themselves as strongly male (1–3), 94 strongly female (9–11), nine identified with the middle (4–8), and two individuals did not identify on this scale. Participants were notified of the study *via* online academic and social media networks and voluntarily completed a “Pivotal Moments and Goals” (PMG) questionnaire, administered *via* Qualtrics<sup>1</sup>, between March 27th and April 6th, 2020. This 10-day window allowed a snapshot of views early in the COVID-19 pandemic—a period of rapid social change in which people comprehended the significance of the crisis and governments instituted lockdowns (the British Prime Minister doing so on March 23rd) (Government United Kingdom, 2020) and travel bans (the United States Centers for Disease Control and Prevention issued a strong travel advisory for New York, Connecticut, and New Jersey on March 28th) (CDC, 2020).

## Materials

### Goal Description

After a consent statement which noted the study’s ethical approval (from the University of Chichester, Approval No.

1920–25), the PMG acknowledged a (consensually recognized) pivotal moment caused by global events and stated our interest in how the social changes triggered by this event may have impacted people’s personal goals. Participants were asked to contemplate an important project they had prioritized prior to the event and to describe it in a provided text box.

### Retrospective Self-Efficacy Beliefs

Participants next rated their confidence that they could do the goal *prior to* COVID-19 events on a 1–100 sliding scale (Bandura, 1977). As a qualitative measure of prior self-efficacy beliefs, participants were asked to describe this confidence in words in two to three sentences. Responses to this and subsequent open-ended items were typed into on-screen text boxes.

The quantitative self-efficacy questionnaire adheres to common practice in the self-efficacy literature, in which self-efficacy beliefs (perceived capabilities to carry out courses of action and achieve aims) are assessed on 100-point scales and without provision of the construct name in questionnaires (Bandura, 2006; Bong, 2006). Qualitative self-efficacy reports are employed rarely (Williams, 1990), yet follow naturally from the fact that self-reflective thinking is primarily formulated through the tools of natural language (Cervone and Lott, 2007). The free prose responses gathered here supplement numerical ratings, allowing a richer, self-guided assessment of self-efficacy and step outside the limitations of traditional empirical questionnaires.

### Contemporaneous Self-Efficacy Beliefs

Current self-efficacy beliefs for goal pursuit were assessed in three steps: a multiple-choice item asking if “you can do this now” (yes, no, unsure); a 1–100 scale rating of confidence that you “can still do this”; and a two to three sentence description of this current confidence.

Before answering subsequent questions, participants were instructed to pause to consider their ideas before responding.

### Caring

Participants were next asked to indicate whether they still care about the goal (yes, no, unsure) and to describe “how and why you care” in two to three sentences.

### Contemporaneous Goal Pursuit

Participants were asked in a multiple-choice format (yes, no, genuinely undecided) whether they were still pursuing their stated goals. They next completed an open-ended report based on this multiple-choice response in which they were asked to indicate either (1) if no, why no; (2) if yes, if anything has changed in goal pursuit; or (3) if uncertain, “Can you say something about this?”

Demographic information (age, gender identity, and country of residence) was collected last so as not to distract people from essential questions. Importantly, all respondents understood that data would be published *via* open source repositories; thus, responses to demographic questions were optional, allowing respondents to preserve as much privacy as they wished.

<sup>1</sup><https://www.qualtrics.com/uk/>



## Exploratory Data Analysis Methods

All freely written responses were analyzed with AWS Amazon Comprehend<sup>2</sup> to confirm English as the language used and then analyze the syntax and its sentiment (positive, neutral, negative, and mixed) (Ribeiro et al., 2016). After an initial review of text-based responses, it came to light that 10 cases incorrectly completed the questionnaire, and these were removed from the sample. These participants either used negatively framed responses which produced negatively coded sentiment analysis (e.g., “I had no reason to think I couldn’t do it unless I went under a bus”) or misunderstood the directive of the questions (e.g., failed to choose a goal from before world events unfolded).

The sentiment analysis uses logistic regression to assign probability that the text sentiment is positive, neutral, negative, or mixed. For example, the first two text questions describe confidence to carry out goals; therefore, negative sentiment scores reflect the probability the text describes this confidence negatively. Thus, 1 minus the negative score provides a number representing total probability showing the text sentiment is not negative (e.g., 1 minus a negative value of 0.2 becomes 0.8). These numbers were calculated and correlated with the corresponding self-efficacy scores to ensure the text reflected the participant’s numerical confidence rating.

Goals and the reasons for pursuing or abandoning goals were qualitatively coded separately by two researchers.

## RESULTS

### Goals, Self-Efficacy, Caring, and Goal Pursuit

#### Goal Description

For descriptive purposes, we first classified the content of participants’ self-described goals into categories that were derived rationally by the investigators subsequent to the reading of all goal content. Goals could be classified into one of six categories, with varying observed frequency of response: educational ( $n = 39$ , 24.22%), professional ( $n = 36$ , 22.36%), change place of residence ( $n = 12$ , 7.45%), house repair ( $n = 6$ , 3.73%), travel ( $n = 38$ , 23.60%), and a range of projects involving personal development ( $n = 30$ , 18.63%).

#### Retrospective and Contemporaneous Self-Efficacy Beliefs

Retrospective and contemporaneous self-efficacy beliefs differed markedly. On the 100-point strength of the self-efficacy rating scale, participants reported high pre-COVID-19 self-efficacy scores,  $M = 84.6$  ( $SD = 20.8$ ,  $SE = 1.64$ ), but much lower contemporaneous, post-outbreak self-efficacy,  $M = 45.6$  ( $SD = 34.7$ ,  $SE = 2.73$ ). Retrospective and contemporaneous strength of self-efficacy differed highly significantly,  $t(160) = 11.6$ ,  $p < 0.001$ .

Complementary results resulted from the analysis of the responses to the multiple-choice item asking, “Can you still do this [goal] now?” On this item, 31.68% of people responded

yes, 35.40% unsure, and 32.92% no. These three subgroups of participants differed highly significantly in their 100-point scale rating self-efficacy beliefs, as would be expected,  $F(2, 158) = 53.6$ ,  $p < 0.001$ , and  $\eta_p^2 = 0.404$  (Cohen, 1988). See **Figure 1** for the change in mean pre-COVID-19 and current self-efficacy scores.

Strong correlations were demonstrated between the pre-COVID-19 self-efficacy scores and verbally reported confidence sentiment scores ( $r = 0.376$ ,  $p < 0.001$ ) and between the current self-efficacy and corresponding verbal confidence sentiment scores ( $r = 0.415$ ,  $p < 0.001$ ), demonstrating these verbal descriptions to be a representative measure of self-efficacy.

Results of a one-way repeated-measures ANOVA using the verbal confidence sentiment scores from the text describing current self-efficacy mirrored results achieved with the current numerical self-efficacy measure, with a highly significant result showing a very large effect with significant differences between groups [ $F(2, 158) = 14.0$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.151$ ].

#### Caring About the Goal

In contrast to the considerable variability in pre- and contemporaneous self-efficacy beliefs, there was relative uniformity in caring about the goal. On the measure of caring, 89.44% of people reported yes that they still cared, 4.35% were unsure, and 6.21% no longer cared about their goal.

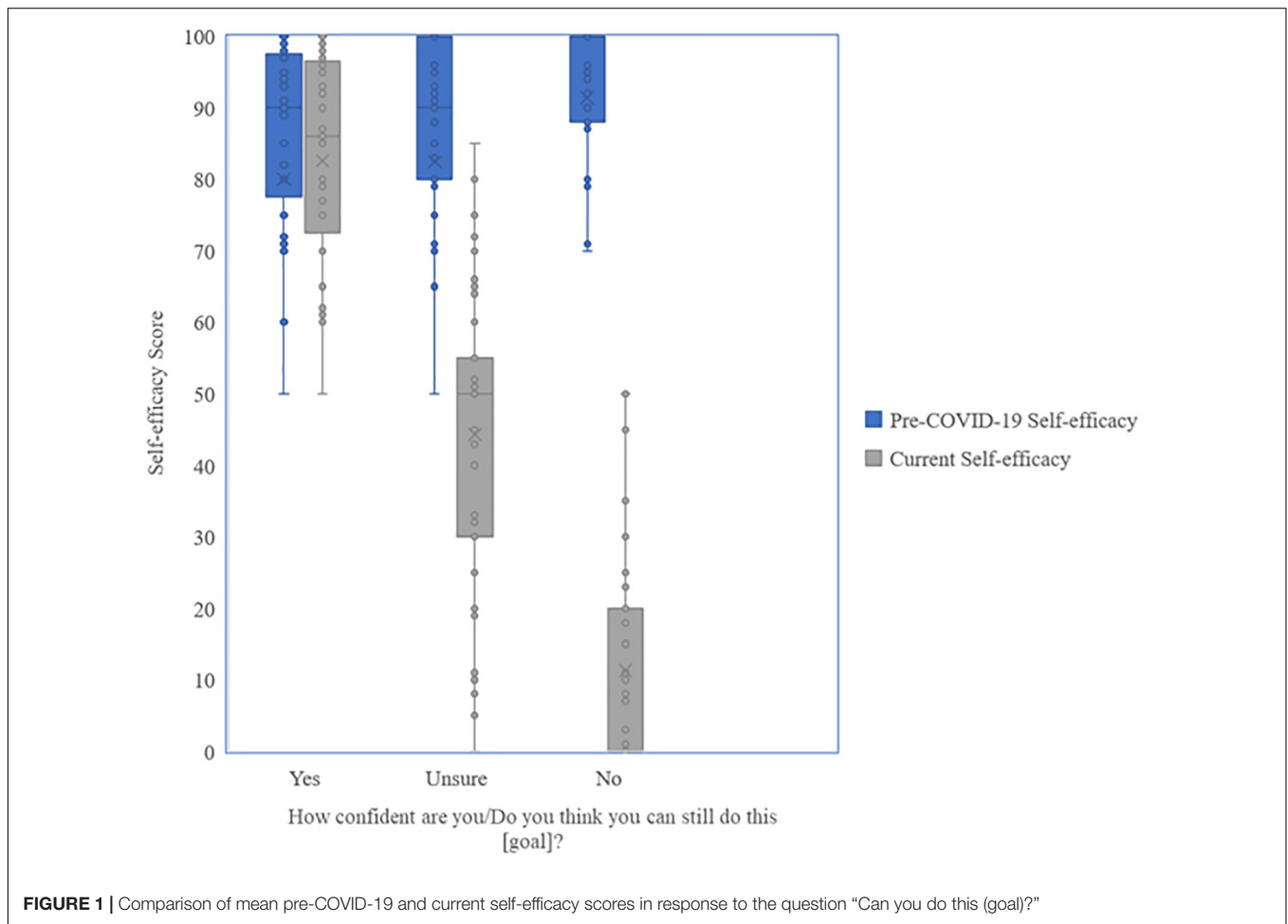
#### Contemporaneous Goal Pursuit

A major question was whether people were continuing to pursue their goal despite the restrictions imposed as a result of COVID-19. Notwithstanding the significance of the goals and high levels of caring, 43 participants (26.70%) indicated that they either were no longer pursuing their goal ( $n = 24$ ) or were undecided about whether they could pursue it ( $n = 19$ ). Of the 118 reporting continued pursuit of their goal, 116 confirmed they still did care and only two reported uncertainty about caring. These two had extenuating personal circumstances that rendered the goal doable but no longer of value. For example, one person reporting uncertainty about caring was planning a course that was canceled, yet they still intended to carry out the planning.

Qualitative coding of textual goal responses revealed reasons both why participants abandoned or maintained the pursuit of their goals. (For the purposes of simplifying this descriptive analysis of textual responses, we combined into a single category the participants who were not pursuing and were undecided about whether they were still pursuing their goal). Those who were no longer actively pursuing their goals ( $n = 43$ ) cited external, often physical factors ( $n = 18$ , 41.86%); general uncertainty and difficulty in making long-term plans ( $n = 12$ , 27.91%); and a shift in priorities where they had to readjust due to caring or health responsibilities ( $n = 11$ , 25.58%). Two responses were unique in their reasons and did not categorize.

Those who maintained their goals ( $n = 118$ ), despite the increased uncertainty because of lockdown and drop in self-efficacy beliefs, presented a range of perspectives and strategies. Some saw COVID-19 as not changing or impacting their goal ( $n = 27$ , 22.88%), whereas a larger group demonstrated either problem-focused coping ( $n = 47$ , 39.83%) or emotion-focused coping ( $n = 18$ , 15.25%) (Folkman and Lazarus, 1980).

<sup>2</sup><https://aws.amazon.com/comprehend/>



Others stated they intended to continue with the goal but exhibited a “holding pattern” ( $n = 16$ , 13.56%), essentially hitting pause during COVID-19. Two of these “holding” people also demonstrated aspects of problem- and emotion-focused coping strategies, for example:

“Yes, by monitoring the situation and wait for news about when we can start planning trips again so we can go. Obviously it won’t be at the same time as my partner’s birthday but at least we will go away and do what we had in mind.”

In order to better understand the qualitative responses of those who continued pursuing their goals, we established a rationally based taxonomy to analyze the text responses based on a syntax analysis. Four groups of strategic behaviors, as shown in **Table 1**, demonstrated active pursuit, engagement, and adaption in relation to goal pursuit in response to the altered conditions imposed by lockdown.

## Relations Between Self-Efficacy Beliefs and Goal Pursuits

Our cross-sectional design of course does not allow an analysis of potential causal relations between self-efficacy beliefs and goal pursuits. We analyzed the relation between these variables

for descriptive purposes, as a way of characterizing patterns of thinking about personal projects that people experienced during the early lockdown period of COVID-19.

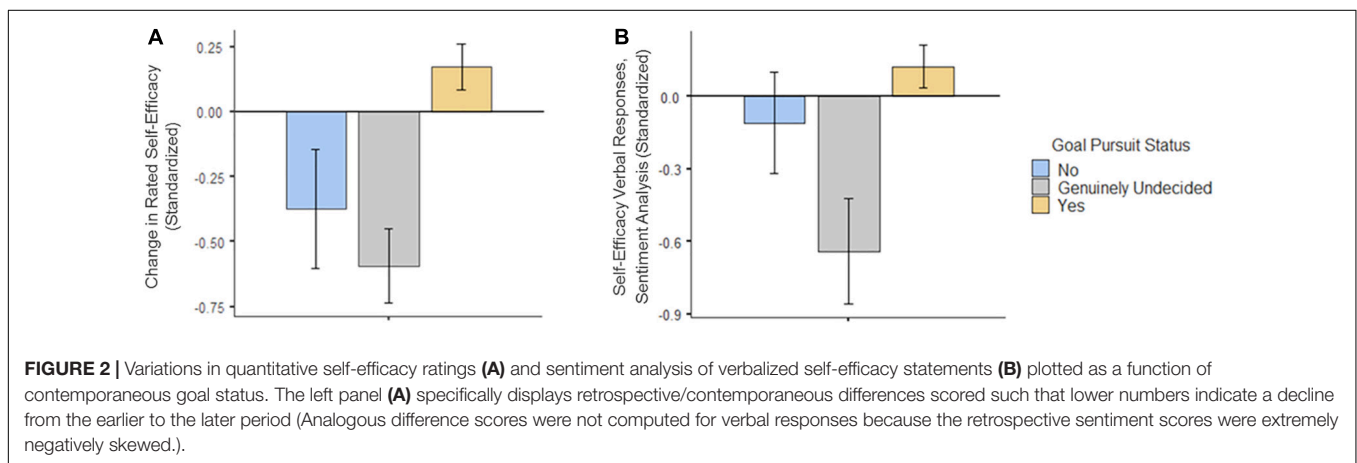
## Goal Pursuits and Self-Efficacy Beliefs

There is more than one way to describe the relations among goal pursuits and self-efficacy beliefs. One is to examine self-efficacy beliefs among three groups of participants, namely, those who were undecided about whether they were still pursuing their goal, were no longer pursuing their goal, and were pursuing their goal (i.e., the subgroups of participants who responded in these ways to the multiple-choice format question about contemporaneous goal pursuit). For these three groups, we analyzed two self-efficacy variables: (1) the magnitude of change (generally a decline) in strength of self-efficacy from pre- to during the COVID-19 lockdown and (2) AWS sentiment analysis scores obtained by coding the verbal responses from the free-response contemporaneous self-efficacy item. Both variables were standardized for ease of presentation of results.

**Figure 2** displays self-efficacy beliefs among participants with each of the three goal pursuit statuses; specifically, it displays both (a) changes in quantitative self-efficacy ratings (retrospective versus contemporaneous) and (b) qualitative

**TABLE 1** | Strategic behaviors reported by those continuing to pursue their goals.

Planning	Engaging with others	Enhanced personal awareness/engagement	Strategic thinking
For the completion of tasks	Accessing assistance with goals	Engaging in dedicated physical activity	Adapting to a new pattern of activity (at home)
For the modification of events/goals	Phoning friends	Self-care—sleep, nutrition	Navigating challenges of new media (online)
For “being ready” to do when restrictions allow (e.g., social distancing or restrictions of movement are not imposed)	Speaking with experts/professionals	New hobbies/activities	New ways to reorient the goal
Maintaining a schedule	Trading ideas	Increased focus and attention	Adaptation and implementation of new methods to circumvent the lockdown challenge
Control of personal time (daily schedules) and engagement with activity because of being at home as a result of lockdown	Collaborative working	Increased contentment, pleasure in tasks	Greater attention to detail
For the future	Using new media to maintain contact (zoom)	Internal motivation	Dedicated, analytical thinking about methods, direction, and timing of tasks
	Developing external facing materials (eBooks, websites)	More personal involvement and a sense of agency	Active monitoring of personal progress and events
			Internal reflection



analysis, namely, the sentiment analysis of contemporaneous self-efficacy verbalizations. The groups differed significantly on both the quantitative [ $F(2, 39.6) = 11.0, p < 0.001$ ] and the qualitative indices [ $F(2, 35.2) = 5.32, p < 0.01$ ]. However, that pattern of differences varied from one to another. On the quantitative self-ratings, particularly large declines in self-efficacy were observed among two subgroups: those who had abandoned and who were undecided about their project pursuit. However, in the sentiment analysis, the most negative scores were displayed by the undecided participants. Some undecided participants expressed multiple negative thoughts when verbalizing beliefs about their ability to pursue their goal, for example, “I’m not sure it’s what I want anymore because I am having a complete rethink about what is important in life. I felt in February that I had slightly overcommitted for this next year, and this has made me reconsider the extent to which I want to keep working. Maybe I have actually retired.”

A second, complementary way of examining relations between self-efficacy beliefs and goal pursuit is to explore goal pursuit status as a function of participants’ responses to the

multiple-choice self-efficacy survey items “Can you still do this?” and “Are you pursuing the task now?” Results revealed a conflict: more than double the people who answered positively to the question “Do you think you can still do this, now that current events have unfolded?” ( $n = 51$ ) confirmed that they were still pursuing their goal ( $n = 118$ ). **Table 2** relates these contemporaneous self-efficacy judgments and goal pursuit responses. As shown, almost all participants who retained confidence in their ability to achieve their goal reported that they

**TABLE 2** | Contemporaneous self-efficacy and goal pursuit.

Can you still do this [goal] now?	Still pursuing goal			Total
	Yes	Unsure	No	
Yes	46	1	4	51
Unsure	28	11	14	53
No	44	7	6	57
Total	118	19	24	161

were still pursuing it. Yet, interestingly, a great many participants who expressed a lack of confidence had *not* abandoned their goal. Factors that include, yet go beyond, reflections on self-efficacy may have influenced the continued pursuit of personal projects.

Responses from those who reported with certainty either abandonment (no) or continuation (yes) to pursuing their goals, where the goals were not travel-related, and all that had similarly low self-efficacy scores ( $\leq 40$ ) are presented in **Tables 3, 4**. Avoiding travel-related goals, which were essentially banned during this lockdown period, allowed for examination of goals that could have the possibility of strategic coping in relation to goal pursuit. The cutoff of 40 for self-efficacy scores encompassed all of those abandoning goals with low self-efficacy; those continuing to pursue their goals with similarly low self-efficacy are also represented in the table. Those who abandoned their goals and reported zero self-efficacy verbally close down the possibility of pursuing a goal. This language demonstrated a lack of strategic thinking, and in line with the self-efficacy theory (Zimmerman et al., 2017), these people quit when faced with the challenge of lockdown. In essence, they were unable or unwilling to engage in strategic behavior to find another way. However, those who confirmed they continued actively pursuing their goal, yet reported zero self-efficacy, often phrased their reasons with the future tense using words like “going to.” They acknowledged the *possibility* of pursuit exists, even if they were uncertain how this would occur.

Those who abandoned their goals yet had some self-efficacy still do not allow for the possibility of achieving the goal despite quantifying their self-efficacy beliefs. There is no use of active verbs, and they frequently use forms of “no” or “not” (e.g., “not possible”), whereas those pursuing goals with a very low self-efficacy score convey a sense of enduring, continuity, and even urgency by using “still” and “need” alongside active verbs. Those actively pursuing goals, even with low self-efficacy scores, demonstrate a noticeable sense of possibility that embraces now and the future.

## DISCUSSION

Our results provide a unique “snapshot” of how the COVID-19 crisis disrupted individuals’ pursuits of personal projects in the early period of the lockdown. Self-efficacy ratings for goal pursuit plummeted. Analysis of verbal self-efficacy reports mirrored the numerical results, showing significant differences between pre-COVID-19 and current self-efficacy beliefs for achieving valued projects. Almost all participants still cared about their goal, yet more than a quarter of the sample either had abandoned it or reported uncertainty about further goal pursuit. Given that sustained pursuit of projects enhances well-being (Little, 1993, 2007), our results highlight a potential psychological toll of the biological pandemic.

The results also, more positively, reveal ways in which people coped successfully with the constraints of the lockdown. Many participants were still working toward their goal, and among these, many reported creative problem-focused and emotion-focused coping strategies that sustained goal pursuit. Our

qualitative methods yielded a “library” of participant-provided pandemic-related coping strategies.<sup>3</sup> In future work, this library of strategies could be provided to others as one element of an intervention to enhance citizens’ well-being in the face of major social disruption (cf. Skoufias, 2003).

Although diverse in many ways, our sample was economically privileged from a global perspective. Many pursued professional and leisure projects inaccessible to lower-income persons. An implication is that our data reveal beliefs about goals people considered meaningful, even aspirational, as opposed to strictly being need-based. Also, at this early stage in the pandemic, reported strategies for understanding and approaching goals did not yet reflect crisis-type coping behavior (Ben-Zur and Zeidner, 1995). Instead, we saw the amplification of perceived limitations to achievement, and the interaction between self-efficacy beliefs and action becomes at least convoluted, and sometimes conflicted.

The initial lockdown phase of this crisis presented unexpected, tangible obstacles for people and challenged the stability of their beliefs toward goals. The imposed restrictions upset the predictable fabric of everyday engagement, and some people were not in an obvious position to enact their reported pre-COVID-19 high self-efficacy and good intentions toward their goals (Gollwitzer and Sheeran, 2006). Overwhelmingly, people still cared about these tasks, but many did not have an available repertoire of appropriate strategies. The pandemic conditions highlighted the need for adaptability to maintain and accomplish goals, and reliance on existing everyday routines may be inefficient and simply impractical under these uncertain conditions.

Creative engagement is a vehicle through which strategic development can flourish, and existing within the established confines of habit neither fosters creativity nor is an option for successfully navigating current challenges. Actively seeking to develop strategic approaches through new learning, developing the “practice of practice” (Antonacopoulou, 2006, p. 5), and the creation and adoption of disruptive innovation take vision and time (Yu and Hang, 2010). It is therefore not surprising that some people, unable to see a direct way forward, effectively put their goals on hold or abandoned tasks completely. In principle, those who abandoned their goals could adopt similar emotional and physical coping strategies used by others. Developing new strategies and perspectives is an enduring challenge for all.

The assessment of self-efficacy in this research, gathering both the quantitative (numeric) and qualitative (dialogic free text) responses, is genuinely novel in the field of self-efficacy research. Our results demonstrated that both methods produced comparable, statistically significant results, and this is a pioneering contribution to the approach of self-efficacy measurement in psychological research. The present research extended the standard questionnaire-based approach to self-efficacy research, with the novel methodological approach of including free-text descriptions of self-efficacy beliefs alongside traditional scalar measures. Anchoring these text responses to both the numerical score and sentient analyses demonstrated

<sup>3</sup>See data file: <https://osf.io/64y2p/>



**TABLE 3** | Non-travel goals abandoned and pursued for those with self-efficacy scores of 0.

Category	Score	Reason abandoned	Category	Score	Reason pursuing
E	0	It's impossible. However, now that I think about it, I am still fulfilling professional obligations that I would have done there, just without the travel, time commitment, expense, and overwhelm of a large conference.	PFC	0	I'm pursuing ways to find other opportunities for alternative musical/professional work. This has moved exclusively to an online format. The overwhelming change to life has meant that each one of us has a glimpse of how life can fundamentally change in an instant - that new uncertainty also means that deferring plans (i.e., for 6 months or 1 year) also carries with it immense uncertainty that was never present in my mind before. It means that now I'm going to try to find ways to make things work in a different way as well.
E	0	General consensus is that predicted grades will be accepted alongside evidence. As school is closed it is not possible to complete work.	PFC	0	I am planning online sessions with different groups of stakeholders during the period I have scheduled to be there
P	0	Time is precious and even if I have to suffer financial losses, I am going to spend it making things that matter to me and finding ways to share them. I will find ways to make money that require less of my soul.	H	0	Postponed to 2021. Once the COVID-19 situation is more clear
P	0	No - because this goal was very specific - I'm not dropping the overall aim of increasing cycling mileage and speed again - just need to focus on what I can currently do - and pick specific event/goal once circumstances change.	H	0	Not actively pursuing as everything on hold. Except for the plans for the kitchen. We're sitting and still planning that on paper.
U	0	The level of uncertainty in risk with regard to gathering people in the same place is simply too high to move forward.	H	0	If/when things return to a sense of normality, I will resume contact with the organizations and community groups I was working with and return to my project. However, how long this will take, if it is achievable at all, is a different kettle of fish.
			H	0	Delaying the event until after the lockdown
			NC	0	Music is the happiness in my life. So I want to make music.

Columns detail the categories for abandonment/method of pursuit (categories for abandonment reason: E, external; P, priorities; U, uncertainty; categories for pursuit explanation: H, holding; NC, no change; PFC, problem-focused coping), numerical self-efficacy score, and participant free-text reason for abandoning/pursuing their goal.

**TABLE 4** | Non-travel goals abandoned and pursued for those with self-efficacy scores of 1–40.

Category	Score	Reason abandoned	Category	Score	Reason pursued
P	1	****If there is no job to pursue, why chase it. Turn energies elsewhere.	O	5	Again, need money or I will starve to death.
E	10	The specific goal is not practical.	PFC	8	Still checking websites and employment agency web sites
E	20	Well I will try to do the French, however, Choir tour and the concert are not going to happen.	O	10	“Yes” as in “I think about it every day but I’m still procrastinating.” There’s a lot of new roadblocks now. I don’t know exactly what but I’m scared to find out.
P	25	No - These goals are now almost bottom of my priority, staying healthy, keeping my flat and re-adapting my teaching business to being completely virtual are my main goals	PFC	10	Still calling friends
E	30	It’s not physically possible due to the lock down and am reluctant to spend savings until we have a better idea of my partners ability to stay in his job/find a new one. I am unable to work.	O	11	I am still planning on going back to school, I just don’t feel that I can make any kind of financial commitment to it while I am so uncertain about my employment, my schedule, my health, medical bills, etc.
P	40	I love my job, and I wouldn’t want the fact that I wish to pursue my goals now have a major impact on my colleagues. It is a matter of timing, and once the situation we find ourselves in currently has died down and hopefully we return to normal, it will be then that I re-evaluate the situation.	EFC	15	I am still writing my book and using this time to think about priorities and redefine orientations and identities. The crisis situation is unexpected but gives me a lot to think about on a broader scale. Can we as a society step out of the crazy market system we have allowed to become total, infesting the very core of our being. The air hasn’t been so clear in as long as I can remember.
			EFC	20	I need to get in the right mindset and fit it in will other tasks that I am undertaking.
			NC	20	Nothing has changed I am just waiting to see what happens after the current situation and what state the economy and housing market is in.
			PFC	30	I will continue to work toward my assessments, even though they are not for the best part of a year. I will try and arrange extra support with my teachers to ensure I am not lacking in quality where I will no longer have that contact time after this semester. I will be asking my Academic Advisor for some kind of personal recommendation so that I am able to get a job despite not graduating this year. I do not wish to jeopardize my overall university grade by doing the alternative assessments at such short notice.
			O	30	At this current point I do not know yet.
			PFC	32	I’m still applying, though for different jobs now. I’ve applied for several “key worker” jobs like Tesco and farm roles. I’ve set up as an online tutor. I’ve signed up as a volunteer. No luck though

Columns detail the categories for abandonment/method of pursuit (categories for abandonment reason: E, external; P, priorities; categories for pursuit explanation: EFC, emotion-focused coping; NC, no change; O, other; PFC, problem-focused coping), numerical self-efficacy score, and participant free-text reason for abandoning/pursuing their goal.

that these free descriptions also produced significant results. This initial step to innovate methods opens the door for further research to explore the syntax of self-efficacy. Future research should aim to understand self-efficacy beliefs in terms of verbal expression, internal thought representation, and the expressed interrelationships between declared externalizations of self-efficacy to enacted beliefs (through tasks) to deepen the understanding of belief and achievement.

## DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found here: Open Science Framework <https://osf.io/64y2p/>.

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## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Chichester Research Ethics Committee. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

LR contributed to the concept, design, definition of intellectual content, data analysis, manuscript preparation, and manuscript editing. DC contributed to the literature search, definition of intellectual content, manuscript preparation, and manuscript editing. BS contributed to the design, data analysis, and manuscript editing. All authors contributed to the article and approved the submitted version.

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# Impact of Coronavirus Disease (COVID-19) Pandemic on Psychological Well-Being of the Pakistani General Population

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**Background and Objectives:** In order to curb the spread of coronavirus disease 2019 (COVID-19), the countries took preventive measures such as lockdown and restrictions of movements. This can lead to effects on mental health of the population. We studied the impact of COVID-19 on psychological well-being and associated factors among the Pakistani general population.

**Methods:** An online cross-sectional survey was conducted between 26th April and 15th May and included participants from all over the Pakistan. Attitudes and worriedness about COVID-19 pandemic were assessed using a structured questionnaire. A validated English and Urdu version of the World Health Organization Well-Being Index (WHO-5) was used to assess the well-being. Factor analysis was done to extract the attitude item domains. Logistic regression was used to assess the factors associated with poor well-being.

**Results:** A total of 1,756 people participated in the survey. Almost half 50% of the participants were male, and a similar proportion was employed. About 41% of the participants were dependent on financial sources other than salary. News was considered a source of fear as 72% assumed that avoiding such news may reduce the fear. About 68% of the population was worried about contracting the disease. The most common coping strategies used during lockdown were spending quality time with family, eating healthy food, adequate sleep, and talking to friends on phone. Prevalence of poor well-being was found to be 41.2%. Female gender, being unemployed, living in Sindh and Islamabad Capital Territory (ICT), fear of COVID-19, and having chronic illness were significantly associated with poor well-being. Similarly, coping strategies during lockdown (doing exercise; spending time with family; eating healthy food; having good sleep; contributing in social welfare work and spending time on hobbies) were also significantly associated with mental well-being.

**Conclusion:** We found a high prevalence 41.2% of poor well-being among the Pakistani general population. We also investigated risk factors of poor well-being which included female gender, unemployment, being resident of ICT and Sindh, fear, chronic illness, and absence of coping strategies. This calls for immediate action at population level in the form of targeted mass psychological support programs to improve the mental health of population during the COVID-19 crises.

**Keywords:** COVID-19, mental health, psychological impact, well-being, Pakistan

## INTRODUCTION

The Corona virus disease 2019 (COVID-19) emerged in Wuhan, Hubei province of China, where a large number of patients presented with pneumonia of unknown etiology (1). Later the disease spread nationwide and across the world between December 2019 to early 2020 (2). The World Health Organization (WHO) announced the outbreak of the novel corona virus disease as a public health emergency of international concern under the International Health Regulations (IHR) on January 30, 2020, and the disease was declared a pandemic on March 11, 2020, affecting 169 countries and almost all continents (3).

COVID-19 not only posed serious threats to physical health but also triggered negative impacts on the social, psychological, and mental health of the population (4). Psychological and mental health refers to the state of people in which they realize their own ability to cope with life stressors (5). Many factors affect the psychological and mental health of the population, for instance uncertainty of the illness, social distancing, self-isolation, and quarantine (6). A nationwide survey conducted in China on 31 January 2020 revealed that the mean score of the COVID-19 Peritraumatic Distress Index (CPDI) was 23.65 ( $\pm 15.45$ ) which inquired about the frequency of anxiety, depression, phobias, cognitive change, avoidance and compulsive behavior, and loss of social functioning in the population. Almost 35% of the respondents experienced psychological and mental health problems (7). Another survey conducted in China analyzed the psychological impact of COVID 19 among the elderly population which revealed that seniors of all age segments have depression and anxiety issues (8).

Pakistan has been in the state of high alert since February 2020 when the first case was notified in the country. Government and health professionals advised for preventive measures to prevent the spread of the disease (6). These measures were later intensified with the increasing number of cases and local transmission. The government implemented complete lockdown, closure of businesses and mosques, restriction of movements, and working at home to promote social distancing and curb the spread of disease. These precautionary measures such as social distancing, staying at home, and lockdown may lead to psychological and mental health problems (6). A study conducted in Karachi, Pakistan, in March 2020 highlighted psychological problems such as increase in anxiety level and fear and changes in the behavior to ensure safety (9).

Studies have confirmed that the outbreak of COVID-19 is associated with various psychological problems, and these may continue even after outbreak is over. It is therefore important to estimate the burden of psychological problems and identify the high-risk groups in the population who may need psychological support during this crisis.

This study was a nationwide survey aimed to analyze the psychological impact of the COVID-19 epidemic in the general population of Pakistan during the outbreak. Findings of this study will be helpful in targeting the vulnerable population having psychological problems and developing a better, scientifically sound and nationwide strategic plan for comprehensive psychological crisis management.

## METHODS

We conducted an online survey among the general population of Pakistan. According to the Population Census of 2017, the total population of Pakistan is 207 million with a growth rate of 2.4%. The administrative units of Pakistan consist of four provinces, i.e., Punjab, Sindh, Baluchistan, and Khyber Pakhtunkhwa, along with two autonomous territories Azad Kashmir and Gilgit-Baltistan and one federal territory, Islamabad (10).

Due to the strict lockdown all over the country to implement social distancing and to control the disease spread, it was not possible to conduct one-to-one interviews in the community. Therefore, we decided to conduct an online survey by using all possible means of contacting the general population. Convenience and snowball sampling strategy was used to enroll the general population of Pakistan. Participants were approached through a web-based self-administered questionnaire which was formulated on Google forms. We circulated the survey link to general population through WhatsApp, Facebook, and email addresses between 26th April and 15th May 2020.

## Sample Size Calculation

Sample size was calculated using open epi sample size calculator (11). We assumed a proportion of 50% of the population to have poor well-being. This 50% proportion would provide maximum variance and sample size. At 95% confidence level and 4% absolute precision, the sample size calculated was 600 participants. We used a design effect of 2.5 to inflate our sample to capture population variability which increased to a sample of 1,500. We further inflated our sample by 20% to account for

incomplete and missing data so the final sample size required was 1,800 participants.

## Data Collection Instruments, Measures, and Variables

Data was collected using a structured questionnaire in English and local language Urdu. The questionnaire was divided into three sections and had a total of 27 questions. The first two questions before the start of demographic information were about their willingness to participate and language selection. The socio-demographic information collected in section 1 included gender, age, city, education, marital status, employment, employment type, family type, and financial support.

The attitudes of the Pakistani general population related to COVID-19 were collected in section 2 and were assessed regarding the following aspects: believing in successful control against COVID-19, believing that Pakistan can win the battle against COVID-19, believing that stopping oneself from watching news will help in decreasing the fear, and believing that the unauthentic and unverified information spreading through forwarded messages is increasing panic about COVID-19. A five-point Likert scale (strongly disagree to strongly agree) was used for all these questions.

To assess the worriedness regarding COVID-19, we asked five questions in section 3 regarding the following aspects: worried about eventually contracting COVID-19 despite taking preventive measures; worried about not being able to survive if they get infected with COVID-19; worried that if they contract the infection, drugs/treatment will have no effect; worried that they will pass the virus onto their family; and not worried of contracting it because they are already old and have lived their life the best way they could. The five-point Likert scale of worriedness was used, which included “no worry at all,” “mildly worried,” “somewhat worried,” “moderately worried,” and “extremely worried.”

## WHO-5 Well-Being Index

The five-item World Health Organization Well-Being Index (WHO-5) is among the most commonly used questionnaires assessing subjective psychological well-being (12). It is a short form of the WHO-10 item and 28-item rating scales (12, 13). WHO-5 can be used as a screening tool for depressive symptoms, monitoring emotional well-being and psychological well-being (14, 15). The WHO-5 items were the following: I have felt cheerful and in good spirits, I have felt calm and relaxed, I have felt active and vigorous, I woke up feeling fresh and rested, and my daily life has been filled with things that interest me. The response alternatives were “all of the time = 5,” “most of the time = 4,” “more than half of the time = 3,” “less than half of the time = 2,” “some of the time = 1,” or “at no time = 0.” The respondents were asked to rate how well each of the five statements applies to them when considering the last 14 days. Each of the five items is scored from 5 (all of the time) to 0 (none of the time). The raw score therefore theoretically ranges from 0 (absence of well-being) to 25 (maximal well-being). The raw score ranging from 0 to 25 was multiplied by four to give the final score from 0 representing the worst imaginable possible

well-being to 100 representing the best imaginable well-being. We used official Urdu version of WHO-5 well-being scale (16).

## Statistical Analysis

Data was downloaded as Microsoft Excel sheet and then imported to IBM SPSS for Windows, v. 22.0 (IBM Corp., Armonk, USA), for analysis. Mean and standard deviations were calculated for quantitative variables such as age, attitude domains and well-being scores. Categorical variables such as gender, marital status, education, employment status, type of employment, family type, region, financial support during lockdown, and disease status were expressed as frequencies and percentages.

The proportion for the attitudes, worriedness, and coping strategies used by the participants at the time of lockdown was determined by using frequencies of individual questions. The five-point Likert scale was converted into three-point responses such as the following: “strongly disagree” and “disagree” were merged as “disagree;” “strongly agree” and “agree” were merged as “agree;” and a middle category was “don’t know.” Similarly, the five-point Likert scale of worriedness was also converted into three-point responses; that is, “No worry at all” and “Mildly worried” and “Somewhat worried” were merged as “Somewhat worried,” and a last category was “Extremely worried.” Factor analysis was done to explore the attitude questions and give them a factor solution. Construct validity for attitude domain items was analyzed using exploratory factor analysis (EFA). To find the best fit to the data, orthogonal (varimax) rotation was used in our factor analysis. Factor loadings of more than 0.40 were considered satisfactory.

Prevalence of poor well-being was determined using a cutoff of  $\leq 50$  score on the 100-point WHO-5 well-being scale (17). Univariate and multivariate logistic regression models were developed to explore the factors associated with poor well-being among general population. Variables were included in the multivariate model based on contribution in the overall model assessed by  $-2$  log likelihood ratios. Crude and adjusted odds ratio (aOR) along with associated 95% confidence intervals (CI) were calculated.

## Ethical Approval

The ethical approval of the study was sought from the Ethics Review Committee of Women Medical College, Abbottabad (20204-2 CMD-ERC-20). The first page of the online form described the purpose of the study and consent was taken on that page from all the participants.

## RESULTS

A total of 1,756 individuals participated in the survey. The mean age of the participants was  $31.5 \pm 10.8$  years, and half (49.9%) were male. More than half (58%) had post-graduation or a professional degree. About 50% were employed, 32% were students, and 6.2% were unemployed. Among the employed, majority (48%) had a private job. The highest proportion of participants was from Khyber Pakhtunkhwa (KPK) 37% followed by Sindh 32%. The most common financial support during

**TABLE 1** | Socio-demographic characteristics of the study participants ( $n = 1,756$ ).

Characteristic	$n$ (%)
<b>Age (<math>n = 1,728</math>)</b>	
Mean (SD)	31.5 (10.8)
<b>Gender (<math>n = 1,730</math>)</b>	
Male	863 (49.9)
Female	876 (50.1)
<b>Marital status (<math>n = 1,745</math>)</b>	
Single	828 (47.4)
Ever married	917 (52.6)
<b>Education (<math>n = 1,733</math>)</b>	
Postgraduate	1,010 (58.3)
Graduate	405 (23.4)
Intermediate	259 (14.9)
Other	59 (3.4)
<b>Employment status (<math>n = 1,746</math>)</b>	
Employed	880 (50.4)
Student	556 (31.8)
Housewife	178 (10.2)
Retired	23 (1.3)
Unemployed	109 (6.2)
<b>Type of employment (<math>n = 871</math>)</b>	
Private job	419 (48.1)
Government job	340 (39.0)
Business	73 (8.4)
Small business/vendor	21 (2.4)
Part time work	10 (1.1)
Laborer	8 (0.9)
<b>Family type (<math>n = 1,745</math>)</b>	
Joint	905 (51.9)
Nuclear	840 (48.1)
<b>Region (<math>n = 1,728</math>)</b>	
Punjab	287 (16.6)
Sindh	553 (32.0)
Khyber Pakhtunkhwa	641 (37.1)
Baluchistan	53 (3.1)
Islamabad Capital Territory	136 (7.9)
Other	58 (3.7)
<b>Financial support during lockdown (<math>n = 1,724</math>)</b>	
Salary	1,013 (58.8)
Savings	266 (15.4)
Business earning	218 (12.6)
Support from friends and family	120 (7.0)
No source	62 (3.6)
Loan	29 (1.7)
Pension	16 (0.9)
<b>Disease status</b>	
Any chronic illness	418 (23.8)
Cardiac disease	38 (2.2)
Hypertension	191 (10.9)
Diabetes	88 (5.0)
Others	206 (11.7)

lockdown was salary (59%), followed by savings (15.4%). The most common chronic disease was hypertension (10.9%) while prevalence of any chronic illness was 23.8% (Table 1).

Table 2 presents the attitude and worries related to COVID-19 among the Pakistani population. About 69% and 73% participants believed that COVID-19 will be controlled globally and in Pakistan, respectively. Seventy-two percent assumed that avoiding news may help reduce the fears of COVID-19. A high proportion (90%) believed that unauthentic information through social media is adding to the panic about COVID-19. About two-thirds (68%) of the population was somewhat worried about contracting the disease even with preventive measures. Six percent were worried about surviving after the infection and no effects of treatment. A little less than half (43%) were extremely worried about transmitting infection to family members.

Prior to factor extraction for attitude domain items, sampling adequacy was checked to ensure suitability for factor analysis. The Kaiser–Meyer–Olkin (KMO) test and the Bartlett test of sphericity (BTS) showed adequate sampling. The number of factors was assessed using eigenvalues  $>1$  and a scree plot which suggested a three-factor solution and explained 57.41% of the total variance. We named the factors as controllability, misinformation, and fear related to the attitude domains of COVID-19. One item was eliminated because it did not contribute to a simple factor structure and failed to meet a minimum criterion of having a primary factor loading of 0.4 or above (Table 3). Descriptive statistics of these domains were run. Mean score was computed as the following: for the controllability domain ( $7.65 \pm 1.80$ ), for the misinformation domain ( $8.07 \pm 1.69$ ), and for the fear domain ( $16.03 \pm 4.61$ ), respectively, with higher scores suggesting higher degree of believability related to items of specific domains.

The most common coping strategies to counter the effects of lockdown and home confinement used by the participants included spending quality time with family (83%), eating healthy food (79%), adequate sleep (77%), and talking to friends on the phone (73%). Other strategies included watching TV/movies, seeking spiritual support, working on hobbies, and reading (Table 4).

The mean score of well-being as measured by the WHO-5 well-being scale was  $55.0 \pm 24.6$  out of a total of 100 points. The prevalence of poor well-being was 41.2%. Detailed results of individual items of WHO-5 are presented in Supplementary Table 1.

We found that being female, being a student, being a housewife, being unemployed, having a nuclear family, living in Sindh and Islamabad Capital Territory (ICT), and having a chronic illness were significantly associated with poor well-being in the univariate analysis. Regarding the attitude domains, the controllability and fear domains were also significant in the univariate analysis. Coping strategies were also analyzed for having an association with poor well-being among the population. In the univariate analysis, individuals who were exercising; spending time with the family; reading; taking healthy food; having a good sleep; participating in social welfare work; spending time on their hobbies; seeking spiritual support; and taking to family & friends on the phone were significantly



**TABLE 2 |** Attitudes and worriedness of Pakistani general population related to COVID-19 (n = 1,756).

Variable	n (%)
<b>ATTITUDES</b>	
<b>COVID-19 will be controlled (n = 1,744)</b>	
Agree	1,207 (69.2)
Don't know	328 (18.8)
Disagree	209 (12.0)
<b>Pakistan will be able to control COVID-19 (n = 1,747)</b>	
Agree	1,270 (72.7)
Don't know	302 (17.3)
Disagree	175 (10.0)
<b>Stopping yourself from watching news will help in decreasing the fear (n = 1,746)</b>	
Agree	1,259 (72.1)
Don't know	105 (6.0)
Disagree	382 (21.9)
<b>Unauthentic information through social media is increasing panic about COVID-19 (n = 1,741)</b>	
Agree	1,577 (90.6)
Don't know	63 (3.6)
Disagree	101 (5.8)
<b>Social distancing will become the new norm and we will not be able to meet people in future like we did before (n = 1,743)</b>	
Agree	540 (31.0)
Don't know	272 (15.6)
Disagree	931 (53.4)
<b>WORRIES</b>	
<b>I will eventually contract COVID-19 despite preventive measures (n = 1,733)</b>	
Not worried at all	483 (27.9)
Somewhat worried	1182 (68.2)
Extremely worried	68 (3.9)
<b>I will not be able to survive COVID-19 if I contract the infection (n = 1,731)</b>	
Not worried at all	636 (36.7)
Somewhat worried	992 (57.3)
Extremely worried	103 (6.0)
<b>Drugs/treatment will have no effect on me (n = 1,716)</b>	
Not worried at all	709 (41.3)
Somewhat worried	903 (52.6)
Extremely worried	104 (6.1)
<b>I am _____ if I get the infection, I will pass onto my family (n = 1,731)</b>	
Not worried at all	172 (9.9)
Somewhat worried	817 (47.2)
Extremely worried	742 (42.9)
<b>I am _____ about contracting it because I am old and have lived my life the best way I could (n = 1,660)</b>	
Not worried at all	706 (42.5)
Somewhat worried	750 (45.2)
Extremely worried	204 (12.3)

associated with better mental well-being. When adjusted for confounding effects of other variables in the multivariate model, we found that females had about 35% higher risk of poor

**TABLE 3 |** Exploratory factor analysis of attitude domains items with Varimax rotation matrix (n = 1,756).

Attitude domains items	F1	F2	F3
<b>Controllability</b>			
COVID-19 will be controlled	-0.071	<b>0.887</b>	0.069
Pakistan will be able to control the COVID-19	-0.128	<b>0.869</b>	0.081
<b>Misinformation</b>			
Stopping yourself from watching news will help in decreasing the fear	-0.042	0.047	<b>0.806</b>
Unauthentic information through social media is increasing panic about COVID-19	0.009	0.174	<b>0.744</b>
<b>Fear</b>			
I will eventually contract COVID-19 despite preventive measures	<b>0.712</b>	-0.144	0.051
I will not be able to survive by COVID-19, if I contract the infection	<b>0.812</b>	-0.107	0.004
Drugs/treatment will have no effect on me	<b>0.796</b>	-0.112	-0.034
I am afraid if I get the infection, I will pass onto my family	<b>0.642</b>	-0.073	-0.008
I am not afraid of contracting it because I am old and have lived my life the best way I could	<b>0.663</b>	0.021	0.085
Social distancing will become the new norm and we will not be able to meet people in future like we did before*	-0.174	0.262	-0.342
% of variance: 57.41%	<b>27.06%</b>	<b>16.94%</b>	<b>13.41%</b>

*Italic indicates loading factor below 0.30. Bold indicates significant factor loading at level above 0.50.*

*\*Excluded because of low loading score.*

**TABLE 4 |** Coping strategies used by participants (n = 1,756).

Strategy	n (%)
Spending quality time with my family	1,464 (83.4)
Eating healthy food	1,386 (78.9)
Adequate sleep	1,348 (76.8)
Talking to friends on phone	1,293 (73.6)
Watching TV/movies	1,155 (65.8)
Seeking spiritual support	1,140 (64.9)
Working on hobbies	931 (53.0)
Reading	894 (50.9)
Contributing in social welfare work	741 (42.2)
Relaxing by meditation/yoga/exercise	725 (41.3)
Playing video games	663 (37.8)

well-being compared to males, aOR 1.35 (95% CI: 1.04–1.75). The unemployed were at about 60% higher risk of having a poor well-being compared to employed individuals, aOR 1.62 (95% CI: 1.02–2.59). Those living in the Sindh province and ICT were also at a higher risk of having a poor well-being compared to Punjab province, aOR 1.54 (95% CI: 1.10–2.16) and 1.82

(95% CI: 1.13–2.93), respectively. Similarly, individuals with any chronic illness were also at a higher risk of poor well-being, aOR 1.71 (95% CI: 1.31–2.23). Similarly, those who believed in controllability were less likely to have mental well-being, aOR 0.88 (95% CI: 0.83–0.94). Those who had fear were more likely to have poor well-being, aOR 1.06 (95% CI: 1.03–1.08). In the multivariate analysis, we also found that persons who were exercising; spending time with the family; taking healthy food; having a good sleep; participating in social welfare work; and spending time on their hobbies were significantly associated with better mental well-being. Other factors such as age, marital status, education status, and family type did not show any significant association with well-being (Table 5).

## DISCUSSION

We conducted a rapid survey to determine the psychological impact of COVID-19 pandemic and its associated factors among the Pakistani general population. This pandemic, apart from the obvious morbidity and mortality, resulted in psychological distress and adverse mental consequences to the population, who are in a constant state of lockdown and quarantine for the last few months (18). The lockdown and curfew measures in Pakistan have affected the lives of common people and as a result triggered psychological problems. Therefore, the estimation of this psychological impact among the general population is crucial in guiding policies and interventions to maintain their psychological well-being. We employed a web-based survey to access the participants throughout Pakistan; it was the first web survey of its kind to assess the psychological impact of the COVID-19 pandemic and its associated factors among the general population of Pakistan.

The finding of our study showed that around 59% of the participants depended on their salary for financial support during the lockdown period. This indicates that 41% of the population depends on sources which can be affected by lockdown. This is important to document that Pakistan is a lower middle income country with limited resources and the major proportion of the population generally struggles to make their ends meet. In this crisis time, when the whole country is shut down, the people living below the poverty line are at high risk of getting affected as they mostly rely on daily wage informal work. There is no effective safety net for the vulnerable population, and therefore, there is an immediate need for the federal and provincial governments to launch the mechanism and programs for the survival of our disadvantage population. On 2nd May 2020, the federal government has launched the Ehsaas program, which promised to provide financial assistance to the unemployed population (19).

Regarding coping strategies adopted by our participants, higher responses were reported for spending quality time with family at home (83%), eating healthy food (79%), taking adequate sleep (77%), and talking to family & friends on the phone (77%). Around two-thirds of the participants reported seeking spiritual support as a coping strategy and 42% of the respondents

contributed in social welfare activities. A study from Karachi, Pakistan, reported that religious coping is a common behavior in patients presenting with symptoms of anxiety and depression (20). One recent study in Italy found that people increased the usage of digital media near bedtime during this COVID-19 lockdown (21). As the uncertainty is high regarding the period of this pandemic, the coping strategies during these depressing times are of utmost importance (22). Our population in general is utilizing this lockdown time with useful activities. However, we think that as the closure of work and other activities would continue, the vulnerable population specifically would be requiring psychological support.

In our study, two-thirds of the respondents were hopeful that the COVID-19 pandemic would be successfully controlled in the world, while three-fourths believed that Pakistan would also be able to control this pandemic through mitigation and prevention efforts. A higher proportion was reported in a recent Chinese study, where 90.8% believed that COVID-19 will finally be successfully controlled and 97.1% had confidence that China can win the battle against the virus (23). In our study, more than two-thirds of the respondents (72%) thought that stopping oneself from watching news would help in decreasing the fear related to COVID-19 during this lockdown. It was alarming that a high majority (91%) also believed that unauthentic information through social media is increasing panic about COVID-19. Balkhi et al., in a recent study in Karachi, also reported that a high proportion (84%) believed that fake news surfacing through social media regarding COVID-19 is causing panic (9). As there is an overflow of unconfirmed information related to COVID-19 on social media and there is a tendency of forwarding these types of posts or videos to the social media circle (24), there is a need to strengthen official channels of communication to educate the masses. People should rely on only official resources from the official account of the Ministry of National Health Services Regulations & Coordination, Pakistan, that would help in decreasing the fear and panic related to the pandemic. One third of the participants also thought that social distancing would become the new norm and it would be difficult to meet people in the future like before. This links to the fear and anxiety related to the lockdown and curfew environment, as the pandemic is continuously rising in all parts of the world.

Regarding concerns and worriedness, more than two-thirds of the respondents (72%) were afraid of getting the disease despite preventive measures. This proportion is higher than that reported among the Chinese population (54%) (25). Another recent study from Karachi, Pakistan, reported that around 42% fear for the safety of their health even when they are at home (9). Our study also reported that around 63% of our participants were worried that they would not be able to survive if contracting COVID-19, which is more than in the China study (30%) (25). Around 90% thought that they would transmit the infection to their family members, if they got the infection. This is supplemented by Balkhi et al. (9), who reported that 94% of the respondents fear for the health of their family members in Karachi. Contrastingly, a lower proportion at 75% was reported in a Chinese population related to family members' susceptibility (25). The worriedness and susceptibility about contracting and

**TABLE 5 |** Factors associated with poor well-being among general Pakistani population during COVID-19 pandemic ( $n = 1,756$ ).

Characteristic	Univariate analysis		Multivariate analysis	
	Crude OR (95% CI)	p-value	Adjusted <sup>a</sup> OR (95% CI)	p-value
Age <sup>®</sup>	0.99 (0.98–1.00)	0.113	0.99 (0.98–1.01)	0.801
<b>Gender</b>				
Male	1		1	
Female	1.46 (1.20–1.77)	<b>&lt;0.001</b>	1.35 (1.04–1.75)	<b>0.025</b>
<b>Marital status</b>				
Single	1			
Ever married	0.88 (0.73–1.07)	0.212	–	–
<b>Education status</b>				
Postgraduate	1		1	
Graduate	1.22 (0.96–1.54)	0.100	1.22 (0.92–1.61)	0.164
Intermediate	1.15 (0.87–1.53)	0.323	1.10 (0.78–1.55)	0.595
Matric and lower	1.45 (0.85–2.46)	0.173	1.04 (0.54–2.00)	0.910
<b>Employment status</b>				
Employed	1		1	
Student	1.26 (1.01–1.57)	<b>0.038</b>	1.17 (0.81–1.68)	0.398
Housewife	1.40 (1.01–1.94)	<b>0.044</b>	0.86 (0.56–1.32)	0.491
Retired	0.68 (0.28–1.67)	0.397	0.49 (0.16–1.47)	0.204
Unemployed	1.87 (1.25–2.81)	<b>0.002</b>	1.62 (1.02–2.59)	<b>0.043</b>
<b>Family type</b>				
Joint	1		1	
Nuclear	1.27 (1.04–1.53)	<b>0.016</b>	1.12 (0.89–1.41)	0.321
<b>Region</b>				
Punjab	1		1	
Sindh	1.38 (1.03–1.86)	<b>0.032</b>	1.54 (1.10–2.16)	<b>0.012</b>
Khyber Pakhtunkhwa	1.30 (0.97–1.73)	0.076	1.18 (0.85–1.65)	0.321
Baluchistan	0.93 (0.50–1.74)	0.829	1.15 (0.55–2.37)	0.712
Islamabad Capital Territory (ICT)	1.79 (1.18–2.72)	<b>0.006</b>	1.82 (1.13–2.93)	<b>0.014</b>
Other	1.19 (0.66–2.14)	0.554	1.34 (0.71 - 2.56)	0.365
<b>Any chronic illness</b>				
No	1		1	
Yes	1.63 (1.30–2.04)	<b>&lt;0.001</b>	1.71 (1.31–2.23)	<b>&lt;0.001</b>
<b>Attitude scale domains</b>				
Controllability <sup>®</sup>	0.82 (0.78–0.87)	<b>&lt;0.001</b>	0.88 (0.83–0.94)	<b>&lt;0.001</b>
Misinformation <sup>®</sup>	0.96 (0.90–1.01)	0.135	–	–
Fear <sup>®</sup>	1.09 (1.06–1.11)	<b>&lt;0.001</b>	1.06 (1.03–1.08)	<b>&lt;0.001</b>
<b>COPING STRATEGY DURING LOCKDOWN</b>				
<b>Exercise</b>				
Yes	1		1	
No	1.99 (1.63–2.43)	<b>&lt;0.001</b>	1.30 (1.03–1.64)	<b>0.028</b>
<b>Spending time with family</b>				
Yes	1		1	
No	2.27 (1.73–2.97)	<b>&lt;0.001</b>	1.40 (1.00–1.95)	<b>0.049</b>
<b>Reading</b>				
Yes	1		1	
No	1.64 (1.35–1.99)	<b>&lt;0.001</b>	1.23 (0.97–1.54)	0.081
<b>Eating healthy food</b>				
Yes	1		1	
No	2.76 (2.16–3.53)	<b>&lt;0.001</b>	1.70 (1.25–2.31)	<b>0.001</b>
<b>Having good sleep</b>				
Yes	1		1	

(Continued)

TABLE 5 | Continued

Characteristic	Univariate analysis		Multivariate analysis	
	Crude OR (95% CI)	p-value	Adjusted <sup>a</sup> OR (95% CI)	p-value
No	2.19 (1.73–2.76)	<0.001	1.39 (1.04–1.85)	0.026
<b>Contributing in social welfare work</b>				
Yes	1		1	
No	1.93 (1.58–2.36)	<0.001	1.34 (1.06–1.71)	0.014
<b>Spending time on hobbies</b>				
Yes	1		1	
No	1.91 (1.58–2.33)	<0.001	1.47 (1.16–1.88)	0.002
<b>Watching movies</b>				
Yes	1		1	
No	1.00 (0.82–1.23)	0.992	0.82 (0.64–1.05)	0.119
<b>Playing video game</b>				
Yes	1		–	–
No	0.99 (0.81–1.20)	0.901	–	–
<b>Seeking spiritual support</b>				
Yes	1		–	–
No	1.66 (1.35–2.03)	<0.001	–	–
<b>Talking to friends on phone</b>				
Yes	1		–	–
No	1.52 (1.22–1.90)	<0.001	–	–

<sup>a</sup>Mutually adjusted for each other.

<sup>c</sup>Continuous variable.

–Not included in multivariate model.

transmitting infection to oneself and family members was higher in our population. A possible explanation could be that there was no complete compliance by the population to the mitigation measures taken by government, which resulted in fear related to spread of COVID-19.

The prevalence of poor well-being in our study was 41.2%. This finding was similar to one of the large Chinese surveys, which reported 35% of the respondents' experienced psychological distress during this pandemic (7). On the contrary, a recent online survey from Malaysia reported 72.1% moderate to severe anxiety (26), while a study from Egypt found 82% mild to moderate anxiety symptoms during this pandemic (27). The difference observed among different countries regarding psychological well-being could be explained by different healthcare infrastructures, the variability in responsiveness of the health system, and the prevention and control measures taken against the pandemic. The use of different tools to assess psychological well-being during this pandemic also makes it difficult to compare the findings. Regarding risk factors, we found that being a female, being unemployed, residing in Sindh & ICT, fear of COVID-19, and having any chronic illness were significant predictors of poor well-being in our population. Studies conducted in China, Iraq, and Spain reported that female gender was found to be an important predictor of depression, anxiety, and stress as compared to males during the COVID-19 pandemic (7, 28, 29). Another systematic review also reported that female gender was found to be more related to psychiatric

disorders (30). Wang et al. also reported that male gender was significantly associated with lower scores in the Impact of Event Scale-Revised (IES-R) as compared to females. Similarly, history of chronic illness was significantly associated with higher IES-R (25, 31), which is also significantly associated with poor well-being in our study. The possible explanation of these findings would be that females as primary caregivers in the households were overburdened with routine household work. In addition, they were also taking care of the responsibilities related to children and male members of the family, who are stuck at home due to lockdown. This made them more vulnerable to poor well-being. Unemployment is also considered as an important factor related to poor well-being, and presence of chronic illness makes the individual vulnerable for psychological issues. People residing in the Sindh & ICT regions were more likely to have poor well-being as compared to the Punjab region. This could be due to differences in socio-political situations and extent of lockdown compliance. However, this needs further exploration. Fear of having COVID-19 and believing that it can be passed to other family members were also significantly associated with poor well-being. Recent studies conducted among the different population groups have also reported that anxiety and fears related to COVID-19 had a significant association with psychological distress and mental health issues (32–35).

We also found that coping strategies; exercise during lockdown; spending time with the family; taking healthy food; having a good sleep; participating in social welfare work; and



spending time on their hobbies were significantly associated with better mental well-being. There were few studies conducted on a sample of university students in Poland and China (36, 37), which have reported that certain coping strategies had a positive effect on mental well-being during COVID-19.

We used a standardized and validated Urdu version of the WHO well-being scale for assessing the well-being of the population. As our questionnaire was in both languages (English & Urdu), we were able to include those people who were not comfortable in responding in the English language. We also did factor analysis to extract domains of attitude items, which enabled the use of a standardized tool. Our respondents were from all provinces, and we took the data from all the major cities of Pakistan. Also, there was a fair distribution of respondents from every region of the country. However, there are some limitations that need consideration. The online web survey was able to capture mostly the urban population of Pakistan, so we cannot generalize our findings to the rural population of Pakistan. As it was an online survey, we used all our possible contacts to invite the population through means of phone calls, messages, and one-to-one interactions. There was an oversampling of a particular characteristic (e.g., younger age group, postgraduate, and participants from KPK), leading to selection bias. However, it may serve as an important resource of psychological assessment for the educated and younger population living in Pakistan. Also, we were not able to include those segments of the population who were non-users of social media applications and those who were illiterate. Nevertheless, this is the first study in Pakistan that focused on the impact of the COVID-19 pandemic on psychological well-being of the Pakistani general population from respondents across all regions in the country. Lastly, with the help of our findings, policymakers can develop psychological interventions that can minimize the psychosocial impact of COVID-19 and also help the most vulnerable groups that are at a higher risk of experiencing poor well-being as a result of this pandemic. These findings may also be applicable to other countries with similar socioeconomic profiles as COVID-19 is affecting all the countries and measures of social distancing are more or less similar globally.

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## CONCLUSION

In summary, prevalence of poor well-being due to the COVID-19 pandemic was 41.2% in our population. We reported the initial data pertaining to the psychological impact of the COVID-19 pandemic in the Pakistani population. The predictors of poor well-being were being a female, being unemployed, being a resident of Sindh & ICT, fear of COVID-19, having any chronic illness, and absence of coping strategies. This calls for the development of psychological support and interventions by the policymakers, for the general population as well as for the high-risk groups.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Review Committee of Women Medical College, Abbottabad (20204-2 CMD-ERC-20). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

AK, FL, and UR conceptualized the study idea, developed methodology, and supervised all the processes. FL and UR performed the data curation. AK and UR performed the data analysis. ZA, FL, AK, UR, Sab, SAR, SI, and MK wrote and reviewed the draft. All authors read and approved the final manuscript.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2020.564364/full#supplementary-material>

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# COVID-19 Pandemic as the Beginning of a Golden Era for Telepsychiatry in Poland's Healthcare System

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## BACKGROUND

The COVID-19 pandemic has had a tragic impact on the health and economy sectors of many countries in the world. The deepening social isolation resulting from limited interpersonal contact, the need for quarantine, overloaded healthcare professionals, and the increasing feeling of global fear, may lead to long-term deterioration in the mental health of societies and outweigh the losses of the current crisis (1).

The new coronavirus has also become an attractive topic for mass media outlets that are outdoing each other in informing the public about the current infection and death rates. At the beginning of March (2), a media campaign was launched in Poland against some patients with COVID-19. The published articles emphasized the fact that infected persons had returned from foreign travels to the country, which caused strong public outrage and accusations of deliberately bringing the virus to Poland. Stigmatization of infected people by mass media particularly affected unaware doctors returning to Poland after a vacation during that time period (3, 4). An avalanche of negative online comments caused by the published articles has led to threats against those physicians, and consequently even to suicide (5, 6). The hate wave is a well-known phenomenon that increases the risk of aggression and the percentage of committed suicides, that requires the use of appropriate strategies to prevent the spread of these adverse social impacts (7).

## FEAR OF THE UNKNOWN

Telepsychiatry is a term first introduced in 1973 by Dwyer (8), that in the current definition is a broad issue and refers to activities carried out with information and communications technology (ICT) for the provision or support of psychiatric services at a distance (9). Despite numerous reports of beneficial effects of e-platforms on mental health (9–11), in the Polish medical community it was a topic of little interest. One possible reason was the later acceptance of this therapy method, that emphasizes the fact that the Polish equivalent of the English definition “telepsychiatry” was first defined in 2003 and until that time remained a widely unknown issue (12). Wojtuszek et al. found, that two-thirds of patients had never heard of this term, and yet half of the respondents saw the usefulness of applying telepsychiatry. In relation to physicians, 84% of respondents have never dealt with the practice of telepsychiatry and 64% would not like its broader implementation in routine medical practice. The article points to administrative difficulties, the lack of relevant legal regulations, technological limitations, no payment for e-services, and security issues as major obstacles to the practice of telepsychiatry (13).

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## THE SNOWS OF YESTERYEAR

One of the restrictions on the use of telemedicine in Poland was also the Medical Code of Ethics (*Kodeks Etyki Lekarskiej – KEL*). Its 9th Article indicates that a physician may only start the treatment thorough a physical examination of the patient. This article allows the possibility of distance treatment, but only in the case of an urgent need (14). The interpretation of that term remains controversial and may be interpreted differently by the physician giving the services, and otherwise by the medical court.

For Poland, the most common reasons for e-consultations are emergency incidents of mental health deterioration most often associated with anxiety disorders, followed by mood disorders (15). Moreover, e-interventions have also been shown to be beneficial to patients with schizophrenia and the therapeutic approach itself was positively evaluated by these patients (12). However, the 6th Article of KEL mentions the physician's freedom to choose the methods of follow-up that are considered most effective. It should be noted that e-services allow patients a significant reduction in travel costs (16). Here, we should refer to the 57th Article of the 2nd Act of KEL, which clearly states that the physician is responsible for choosing the form of diagnosis or therapy without putting the patient at an unreasonable expenditure (14). Therefore, there are no premises preventing the provision of telepsychiatry with regard to ethical concerns.

## THE METAMORPHOSES

The position of the Polish government on the latest changes in the Law of December 5, 1996 on the profession of physicians and dentists should be considered as positive. The Act allows clinicians to carry out diagnostic and therapeutic activities through ICT (17). The law as a valid legal act dispels any doubts about the application of telemedicine in Poland. The positive impact on the position of these services in the Polish healthcare system has also the obligation to provide e-prescriptions using the recently introduced IT platform, which has been in place since January 8, 2020 (18). These changes contribute to the better understanding of the digitization of medical systems, that should lead to increased trust in the use of ICT services.

Before the most recent pandemic, Polish psychiatrists highlighted the lack of places for patients who required hospitalization in mental health units, which resulted in the inability to provide medical benefits in line with current needs. Child and adolescent psychiatry has been particularly hit by this problem, where the needs were greatest, and the level of underfinancing remained high. The pandemic crisis caused concern associated with the obvious determinative state of the health status of patients who were in remission and the expected acceleration of mental health problems in the general population. The Polish Psychiatric Association (PTP) and the national psychiatry consultant took the initiative by making appropriate statements addressed to both the Ministry of Health and the National Health Fund of Poland. National consultants are appointed by the Minister of Health from among specialists in particular fields and their duties include but are not limited to: the initiation of national epidemiological research,

**TABLE 1** | Characteristic of telepsychiatric services available in Poland.

Subject	Description
Service definition	A remote visit (e-visit, tele-visit, online visit)
Customer	Patient identification required (identity card), the need to provide patient's personal data (first and last name, address, national identification number (PESEL) or the guardian's data (for patients with intellectual disabilities or if incapacitated)
Service provider	Physician, psychologist, psychotherapist
Recommended form of service provision	Telephone conversation or video consultation that ensures encrypted transmission; video communicators are the preferred form ( <i>empathic patient-physician relationship; possible observation of facial expressions, reactions and patient behavior</i> )
Requirements	Past medical history, current medical documentation, including the results of laboratory tests and/or neuroimaging findings the physician may ask the patient to send scans of documentation by an email or via SMS/MMS.
Responsibility	The consequences of providing incorrect, incomplete, false, misleading or otherwise incorrect data are the sole responsibility of the patient.
Restrictions	The examination cannot fully replace a direct medical or psychological examination; teleconsultation is allowed only if a direct examination cannot take place
Important reasons allowing the patient to be examined at a distance	Epidemiological threat, forced isolation of the patient or unavailability for other reasons
Conditions for refunding benefits	Provision of services using ICT systems at the place of providing benefits

ICT, Information and communications technology; SMS, Short message service; MMS, Multimedia messaging service.

Based on recommendations of the Scientific Section of Telepsychiatry of Polish Psychiatric Association (19); Regulation of the Minister of Health of 16th March, 2020 (20).

the forecast of health needs in their specific field, advising on the implementation of important tasks in the Polish healthcare system, and giving opinion and advice on tasks related to the training program of medical specialists. Adequate action by the PTP contributed to an immediate change in Polish legislation for the provision of on-line services. The latest PTP recommendations are summarized in **Table 1**.

## THE REVOLUTION - TELEMEDICAL SERVICES ARE JUST AS IMPORTANT AS AN IN-PERSON VISIT

The Polish Chamber of Physicians and Dentists (*Naczelna Izba Lekarska - NIL*) at a meeting on July 24, 2020 adopted an act on the recognition of guidelines for the provision of



telemedicine services along with the recommendation of its use by physicians and dentists as part of their profession. As highlighted, a significant contribution in the legislative work should be attributed to the statements made by Polish medical societies and recently implemented changes to the legal norms (21). Moreover, the Presidium of NIL called on the Minister of Health to undertake prompt steps leading to the introduction of proposed guidelines as an existing standard for the Polish healthcare system (22, 23). The appeal took into account the benefits of implementing telemedicine services into routine medical practice, as well as the negative impact of the COVID-19 pandemic which required adequate action, justifying the immediate use of ICT services.

Obviously, the provision of telemedicine services must be consistent with the Polish legal system. The emphasis was placed on the issue of the security of the patient's personal data and medical data, emphasizing the need to maintain medical confidentiality when performing e-services. Healthcare institutions providing e-services in the field of telemedicine are required to secure data transmission and enable optimal accessibility to such services for every recipient. This means ensuring appropriate system requirements, securing the network, and providing facilities with all electronic tools needed to enable e-consultation with a patient. With regard to medical practitioners, the appropriate amendments to professional liability related to the provision of telemedicine services have been taken into account, in light of which the use of telemedicine is not only highly recommended, but also mandatory when the patient's condition requires it. If a physician fails to provide e-services, when available and required, they could be held legally liable for malpractice. The healthcare entities employing medical staff are now responsible for their mistakes resulting from given e-services, if the employee was hired under an employment contract. In case of a contract physician, the liability rules will be enforced individually on the basis of the concluded contract.

A need to use telemedicine services during the COVID-19 pandemic was noticed, which was emphasized in the prepared guidelines as well as in the written communication to the Minister of Health. An additional interpretation was also introduced in relation to the previous rules of medical ethics, which previously limited the implementation of e-services, thus a physical examination of the patient is currently recommended only in cases where it is necessary to perform it. The following NIL directives, included in the guidelines, are particularly worth emphasizing:

- Telemedicine is a recognized method of patient care, and thus it can be treated as one of the standards of medical treatment.
- The medical practitioner should use the potential of telemedicine to realize the patient's rights.
- Telemedicine enables the implementation of individual patient rights in a new, digital way.
- Telemedicine advice should not be disregarded due to its remote form. The rules of professional, civil, and criminal liability for telemedicine services are the same as in the case of other services, and the recipient receives all rights pertaining to a patient.

The adopted guidelines constitute a decisive and important turnaround to the previously discussed limitations of the implementation of telemedicine services resulting from some articles of KEL.

## IT IS TOO SOON FOR THE EPILOG

The updates incorporated into the Polish healthcare sector are moving in the right direction. In our opinion, previously hospitalized patients on long-term treatment will benefit the most. Many of them are often in contact by phone to provide expert support. There are still doubts to first-time treated patients, where the diagnosis, often in psychiatry, is based on medical history and may be difficult, thus actions taken will be at risk. However, it should be noted that in the face of the current pandemic, special care is required for patients with anxiety disorders. Panic and behavioral change due to the necessity of wearing gloves and medical masks to protect against the contamination by the new coronavirus may increase anxiety and polarize the current problems in the direction of a "coronaphobia" (24). The increased availability of e-services will also intensify the phenomenon of the deinstitutionalization of Polish psychiatry, will help patients gain access to medical specialists, and it will reduce the difficulties included with a limited number of hospital beds. Therefore, we look forward to the future with optimism.

## AUTHOR CONTRIBUTIONS

ŁZ: study design, preparation of the manuscript in Polish and English, and selection of references, MO: correction of the Polish version of the manuscript and selection of references. All authors significantly contributed to the writing of the manuscript and approved its final version.

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# Patients Living With Breast Cancer During the Coronavirus Pandemic: The Role of Family Resilience, Coping Flexibility, and Locus of Control on Affective Responses

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The coronavirus disease 2019 (COVID-19) pandemic has strongly affected oncology patients. Many screening and treatment programs have been postponed or canceled, and such patients also experience fear of increased risk of exposure to the virus. In many cases, locus of control, coping flexibility, and perception of a supportive environment, specifically family resilience, can allow for positive emotional outcomes for individuals managing complex health conditions like cancer. This study aims to determine if family resilience, coping flexibility, and locus of control can mitigate the negative affect caused by the pandemic and enhance positive affect in breast cancer patients. One hundred and fifty-four female patients with breast cancer completed the Walsh's Family Resilience Questionnaire, the Perceived Ability to Cope With Trauma Scale, the Positive-Negative Affect Schedule, and the Mini Locus of Control Scale. Family resilience and internality of locus of control contribute significantly to positive affective responses. Family resilience is responsible for mitigating the negative affect perceived during the pandemic and is enhanced by external locus of control. Evidence suggests that clinical psychologists should develop and propose programs to support oncology patients' family resilience, coping flexibility, and internal locus of control, allowing for decreased stress and improved adaptability for effectively managing cancer treatment during the pandemic.

**Keywords:** breast cancer, coronavirus, COVID-19, locus of control, coping flexibility, family resilience, breast cancer patients

## INTRODUCTION

Since late February 2020, Italy has been drastically affected by the coronavirus disease 2019 (COVID-19) pandemic, resulting in approximately 229,300 positive cases and 33,000 deaths (World Health Organization, 2020). The pandemic has required a restructuring of the hospital system and suspension of all non-essential health services to better manage the influx of COVID-19 patients while also reducing potential exposure to uninfected patients (Curigliano et al., 2020; van de Haar et al., 2020). The pandemic has also necessitated the implementation of a countrywide

lockdown – effective at the beginning of March 2020 – including the closure of places previously open to the public, suspension of all non-essential activities, telecommuting requirements for the workforce, and a stay-at-home order for the general population.

Many COVID-19 patients have presented with comorbidities like cardiovascular disease, liver disease, or malignant tumors (Guan et al., 2020; Thakur, 2020; Yang et al., 2020). However, evidence remains unclear if oncology and other immunosuppressed patients are at an increased risk of severe complications from the virus as compared with healthy individuals among the general population (D'Antiga, 2020; Desai et al., 2020). Oncology patients have been more strongly impacted by the pandemic, not only because of the fear and panic of increased risk of infection (Casanova et al., 2020; Mark and Lewis, 2020; Romeo et al., 2020) but also because many treatment and screening programs have been postponed or canceled until the spread of the virus is stabilized, potentially compromising the affective states of these patients. Donovan stated that when traumatic events like cancer diagnoses or emergency situations arise, personal outcomes – adaptation versus maladaptation – are affected by family response (Donovan, 1998). Additionally, the Double ABC-X model (McCubbin and Patterson, 1983) explains that the interaction between the traumatic event and subsequent life stressors is determined by perceptions of family support, coping strategies, and locus of control.

Family resilience is defined as the perceived ability of a family to withstand a crisis which disrupts their normal course of life and can be a protective factor against stress and negative affect (Walsh, 1996). Perceptions of family's role, system of beliefs, values, and behaviors are essential in helping a family member overcome traumatic events (Patterson, 2002). For example, if one family member has been diagnosed with cancer, perceived high levels of family resilience can significantly influence personal outcomes such as medication compliance, rehabilitation, and social or occupational reintegration (Faccio et al., 2018). These resources may also offer support in overcoming challenges like negative emotions linked to heightened perception of risk, mandatory quarantine, and possible postponement of treatments presented by the COVID-19 pandemic (Killgore et al., 2020; Prime et al., 2020; Russell et al., 2020).

Another protective factor is coping flexibility. A literature review by Kashdan and Rottenberg (2010) identified coping flexibility as a vital component of health and adjustment to stressors across a variety of settings. Since the early 1990s, coping flexibility has been associated with improved well-being and success in confronting stress (Lester et al., 1994). Additionally, it is associated with decreased anxiety and depression as well as symptom severity, ultimately increasing overall quality of life (Cheng, 2003; Kato, 2012, 2015). These studies demonstrate that coping flexibility contributes to improved psychological well-being, further confirmed by individuals' reports of decreased levels of depression and increased abilities in managing work-related stress following completion of a coping flexibility intervention (Cheng et al., 2012).

When assuming a situational perspective, a cross-situational view of coping flexibility supports that coping-flexible individuals can adjust their strategies across stressful events (Westman and Shirom, 1995; Murphy, 2001; Thompson et al., 2007). Oncology

patients, for example, have already experienced a severe adverse traumatic event – cancer diagnosis and prognosis – which can introduce important emotional consequences (Williams, 2002) and coping challenges (Nipp et al., 2016). Coping flexibility (Oliveri et al., 2019a) is therefore considered a valuable tool that allows such patients to reduce distress (Bonanno et al., 2011) during stressful circumstances (Roussi et al., 2007) like the COVID-19 pandemic. Coping flexibility remains especially vital in reconciling the need to both elaborate the trauma and maintain a positive outlook toward the future after the event has subsided (Bonanno et al., 2008). Oncology patients who can access these coping resources are more likely to endure the pandemic and subsequent lockdown with adequate emotional response (Kaliampou and Roussi, 2018). Examining emotional responses of breast cancer patients during the pandemic can therefore be a preliminary approach to understanding its impact.

Patients' affect during the COVID-19 pandemic is also influenced by locus of control (Romeo et al., 2019), which determines if individuals perceive the events they are experiencing to be driven by external (e.g., circumstances) or internal (e.g., individuals' personality, abilities, etc.) factors (Rotter, 1966). These beliefs influence individuals' cognition, behavior, and affect (Wallston et al., 1978). Evidence has shown that having an internal locus of control is a strong predictor of better psychological adjustment to cancer: behavioral scientists have long been interested in understanding how an individual's locus of control relates to coping and adjustment (Knappe and Pinquart, 2009; Galvin et al., 2018). Recent research highlights that internal locus of control generates positive emotions and lessens negative ones (Crisson and Keefe, 1988; Gupta et al., 2018). Thus, internal locus of control lowers the perceived level of distress (Ryan and Deci, 2008), threat, and depression (Arraras et al., 2002; Goldzweig et al., 2016) while improving the quality of life (Sharif and Khanekharab, 2017; Toscano et al., 2020) among patients.

The literature therefore highlights the role of these variables in reducing the levels of distress and in promoting psychological adjustment. At the moment, there is no empirical evidence on their impact on Italian cancer patients' affects during the first month of the 2020 lockdown. Therefore, the purpose of this paper is to determine if family resilience, coping flexibility, and locus of control can mitigate the negative affect and enhance positive affect in Italian oncology patients during the first month of the COVID-19 pandemic.

## MATERIALS AND METHODS

The study was reviewed and approved by the IEO (Istituto Europeo di Oncologia) Ethic Committee. The patients/participants provided their informed consent to participate in this study.

### Procedure

Participants were eligible for the study if the patient (a) was female, 40–70 years of age at the time of recruitment diagnosis; (b) had a breast cancer diagnosis requiring surgery; (c) is receiving any type of systemic treatment for breast cancer



regardless of treatment type; and (d) could both read and speak Italian. All patients received their diagnosis in 2019 or later, and all the patients had cancer in stages I–III. Participants were recruited using a convenience sampling method during the COVID-19 quarantine. Participants were a pool of IEO patients who at the time of the admission gave their availability to participate to research studies and were at the time enrolled in other research projects. All eligible patients were contacted through email or telephone, on the preferred method of contact they gave for the study. A message was included to invite them to take part to the study and an anonymous link to the survey was included.

The survey was hosted by Qualtrics, and an anonymous link was made available to the patients. Participation in the study was voluntary, and patients could withdraw from the study at any time. Participants signed consent forms and completed questions regarding sociodemographic characteristics as well as questions regarding family resilience, coping flexibility in trauma, locus of control, and positive and negative affect. The questionnaire was available from March 19th to March 31st, 2020, starting 4 weeks after the partial lockdown (school closure) and 10 days after the full lockdown (closure of all non-essential businesses and movement restrictions) in Italy.

## Participants

Out of a total of 250 women with breast cancer, 181 started the questionnaire, and 154 completed the questionnaire. Mean age was 51.07 (SD = 7.93). Thirty-seven (20.4%) were single and 146 (79.6%) were in a stable relationship (married or cohabiting), and 127 (70.2%) had children. Regarding educational levels, 40.3% ( $n = 73$ ) of the participants possessed a high school diploma, 7.2% ( $n = 13$ ) achieved a bachelor's degree, and 26% ( $n = 47$ ) achieved a higher specialization. One hundred and twenty-five participants (69.1%) were still receiving systemic treatment that included chemotherapy, radiotherapy, and/or endocrinological treatment at the time of the survey. All percentages were calculated for total available cases for each demographic variable.

## Measures

After completing the sociodemographic form, participants were asked to fill the following sections:

Family resilience (FR) was measured with the Italian version of the Walsh's Family Resilience Questionnaire (Rocchi et al., 2017), a 26-item questionnaire, on a five-point Likert scale (1 = "not at all"; 5 = "completely agree") assessing the three dimensions of family resilience: shared beliefs and support, family organization and interaction, and utilization of social resources. Shared beliefs and support (FR\_SBS) includes values, beliefs, and attitudes, establishing a set of shared suppositions that activate emotional responses, form decisions, and orientate action (15 items). Family organization and interaction (FR\_FOI) is the perceived family capacity to adapt and identify collaborative solutions to manage crises and avoid conflicts (eight items). Utilization of social resources (FR\_USR) indicates individuals' perceived ability of the family to harness support from social and institutional organizations (three items).

Coping flexibility (CF) was measured with the Italian version of the Perceived Ability to Cope With Trauma Scale (PACT) (Saita et al., 2017), which examines the broad categories of coping behaviors in response to potentially traumatic experiences. The Italian version of the PACT differs from the original one for the number of items and dimensions: The questionnaire was composed of 14 items which asked participants to rate their ability to use different coping strategies on a seven-point scale (1 = "not at all able"; 7 = "extremely able"). Forward focus (CF\_FF, nine items) is the component that assesses coping abilities related to maintaining plans and goals, attending to the needs of others, thinking optimistically, remaining calm, reducing painful emotions, and laughing. The trauma focus subscale (CF\_TF, five items) explores the ability to fully experience the emotional and cognitive significance of a stressful, and potentially traumatic, event.

Locus of control (LOC) was measured with the Italian version of the six-item Mini Locus of Control Scale (MLCS) (Perussia and Viano, 2008). It is a self-reported scale that investigates locus of control based on three factors: chance (LOC\_C, two items), powerful of others (LOC\_PO, two items), and internality (LOC\_I, two items). The questionnaire is composed of six items on a four-point Likert scale (1 = "not at all"; 4 = "completely agree").

Affect was measured through the Positive-Negative Affect Schedule (PANAS) (Terraciano et al., 2003). This scale is comprised of two 10-item mood scales and was developed to provide brief measures of positive and negative affect. Subjects are asked to rate each peculiar emotion experienced within a specified time period, with reference to a five-point scale (1 = "very slightly or not at all"; 5 = "very much"). The specified time period in this case was 15 days before the questionnaire was completed, taking place during the COVID-19 pandemic in Italy.

## Statistical Strategy

Demographic variables were described using descriptive statistics. Before proceeding with the regression analyses, assumptions were checked and the data met the requirement for the analysis. Two stepwise regression analyses (forward method with removal test for the least useful predictor) were conducted with dimensions of family resilience, dimensions of locus of control (chance, powerful others, internality), and coping flexibility as predictors, with positive and negative affect as outcome variables. Variance inflation factors (VIF) revealed acceptable values of collinearity between independent variables and are included in **Table 2**.

## RESULTS

**Table 1** shows the mean, standard deviations, and correlations among variables for both the regression outcome variables. Positive affect correlates adequately with all the other variables included in the analysis, except for the chance dimension of the locus of control (LOC\_C). Negative affect is significantly correlated with all the variables considered. The chance dimension of locus of control (LOC\_C) is not connected with the trauma focus factor of coping flexibility (CF\_TF). Other

non-correlated variables are two dimensions of locus of control: internality (LOC\_I) and chance (LOC\_C). Please see **Table 1** for detailed results of the correlation analyses.

The first stepwise multiple regression was conducted to evaluate whether the dimensions of family resilience, coping flexibility, and locus of control were necessary to predict positive affect. The analyses generated three models (please see **Table 2** for details). The final model of the regression analysis accounted for 45.4% of the variance of positive effect with three predictors (family organization and interaction of family resilience, the trauma focus subscale of coping flexibility, and internality of locus of control) with a significant improvement from previous models. Other variables – chance of locus of control (LOC\_C:  $t = -0.433, p = 0.666$ ), powerful of others of locus of control (LOC\_PO:  $t = 0.101, p = 0.902$ ), forward focus of coping flexibility (CF\_FF:  $t = 1.179, p = 0.240$ ), shared beliefs and support of family resilience (FR\_SBS:  $t = 1.007, p = 0.316$ ), and utilization of social resources of family resilience (FR\_USR:  $t = 1.417, p = 0.159$ ) – did not enter the model at any stage (refer to model 3 for values reported).

The second stepwise multiple regression was conducted to evaluate whether the same variables were necessary to predict

negative affect. Three models were calculated (please see **Table 2**). The multiple correlation coefficient for the final model was 0.57, indicating that approximately 33.1% of the variance of positive affect could be accounted for by family organization and interaction of family resilience, the powerful of others dimension of locus of control, and internality of locus of control, with a significant improvement from the other models. Internality of locus of control (LOC\_I:  $t = -0.454, p = 0.650$ ), forward focus in coping flexibility (CF\_FF:  $t = -1.090, p = 0.278$ ), trauma focus subscale of coping flexibility (CF\_TF:  $t = 1.117, p = 0.266$ ), shared beliefs and support of family resilience (FR\_SBS:  $t = -0.459, p = 0.647$ ), and utilization of social resources of family resilience (FR\_URS:  $t = 0.307, p = 0.759$ ) did not enter the model at any stage (refer to model 3 for values reported).

## DISCUSSION

The data highlights that family resilience, coping flexibility, and locus of control contribute significantly in managing the positive and negative affect in patients with cancer during the COVID-19 pandemic in Italy. Results show that one dimension of each

**TABLE 1** | Means, standard deviations, and correlations for all the variables considered.

	Mean	Std. deviation	1.	2.	3.	4.	5.	6.	7.	8.
Positive affect	2.979	0.778	0.385**	-0.106	-0.178*	0.560**	0.481**	0.499**	0.603**	0.408**
1. Locus of control_internality (LOC_I)	3.302	0.410		0.053	-0.167*	0.402**	0.302**	0.256*	0.276**	0.139*
2. Locus of control_chance (LOC_C)	2.656	0.678			0.375**	-0.155*	-0.085	-0.122	-0.158*	-0.086
3. Locus of control_powerful of others (LOC_PO)	1.753	0.622				-0.280**	-0.095	-0.384**	-0.289**	-0.190*
4. Coping flexibility_forward focus (CF_FF)	5.049	0.920					0.631**	0.490**	0.654**	0.380**
5. Coping flexibility_trauma focus (CF_TF)	5.003	0.871						0.332**	0.438**	0.340**
6. Family resilience_shared beliefs and support (FR_SBS)	56.630	9.345							0.742**	0.532**
7. Family resilience_family organization and interaction (FR_FOI)	28.721	4.758								0.516**
8. Family resilience_utilization of social resources (FR_USR)	9.461	1.961								
Negative affect	2.150	0.710	-0.170*	0.297**	0.413**	-0.399**	-0.138*	-0.419**	-0.481**	-0.241*
1. Locus of control_internality (LOC_I)	3.301	0.409		0.053	-0.167*	0.402**	0.302**	0.256*	0.276**	0.139*
2. Locus of control_chance (LOC_C)	2.655	0.677			0.375**	-0.155*	-0.085	-0.122	-0.158*	-0.086
3. Locus of control_powerful of others (LOC_PO)	1.753	0.621			1.000	-0.280**	-0.095	-0.384**	-0.289**	-0.190*
4. Coping flexibility_forward focus (CF_FF)	5.049	0.919					0.631**	0.490**	0.654**	0.380**
5. Coping flexibility_trauma focus (CF_TF)	5.003	0.870						0.332**	0.438**	0.340**
6. Family resilience_shared beliefs and support (FR_SBS)	56.629	9.345							0.742**	0.532**
7. Family resilience_family organization and interaction (FR_FOI)	28.720	4.757								0.516**
8. Family resilience_utilization of social resources (FR_USR)	9.461	1.960								

$N = 154$ . \*\* indicates significant values at  $p < 0.000$ , \* indicates significant values at  $p < 0.05$ .

**TABLE 2** | Regression models, beta values and collinearity statistics for the two regression analyses.

	Unstandardized coefficients		Standardized coefficients			<i>R</i>	<i>R</i> <sup>2</sup>	Model change				Collinearity statistics	
	<i>B</i>	Standard error	Beta	<i>t</i> test	Sig.			<i>F</i> change	Df1	Df2	Sig. <i>F</i> change	VIF	
<b>Outcome: positive affect</b>													
1 (Constant)	0.0148	0.308		0.481	0.631								
Family resilience_family organization and interaction (FR_FOI)	-0.099	0.011	0.603	9.308	0.000	0.603	0.363	86.639	1	152	0.000	1.000	
2 (Constant)	-0.501	0.338		-1.481	0.140								
Family resilience_family organization and interaction (FR_FOI)	0.079	0.011	0.485	7.040	0.000							1.273	
Coping flexibility_trauma focus (CF_TF)	0.240	0.062	0.808	3.909	0.000	0.649	0.442	15.28	1	151	0.00	1.237	
3 (Constant)	-1.354	0.435		-3.110	0.002								
Family resilience_family organization and interaction (FR_FOI)	0.074	0.011	0.450	6.616	0.000							1.273	
Coping flexibility_trauma focus (CF_TF)	0.202	0.061	0.226	3.296	0.001							1.294	
Locus of control_internality (LOC_I)	0.365	0.122	0.192	2.999	0.003	0.674	0.454	8.994	1	150	0.003	1.132	
<b>Outcome: negative affect</b>													
1 (Constant)	4.212	0.309		13.621	0.000								
Family resilience_family organization and interaction (FR_FOI)	-0.072	0.011	-0.481	-6.756	0.000	0.481	0.231	45.647	1	152	0.000	1.000	
2 (Constant)	3.241	0.372		8.721	0.000								
Family resilience_family organization and interaction (FR_FOI)	-0.059	0.011	-0.394	-5.595	0.000							1.091	
Locus of control_powerful of others (LOC_PO)	0.342	0.081	0.300	4.252	0.000	0.560	0.313	18.078	1	151	0.000	1.091	
3 (Constant)	2.912	0.404		7.216	0.000								
Family resilience_family organization and interaction (FR_FOI)	-0.058	0.010	-0.386	-5.530	0.000							1.094	
Locus of control_powerful of others (LOC_PO)	0.283	0.085	0.248	3.333	0.000							1.242	
Locus of control_chance (LOC_C)	0.150	0.076	0.143	1.983	0.049	0.575	0.317	3.933	1	150		1.167	

Regression models, beta values and collinearity statistics for the two regression analyses.

considered construct contributes to positive affect levels. Family organization and interaction (FR\_FOI) is the main predictor for positive affect, as it is possible that the pandemic required patients and their family to adapt their previous organizational and interactive patterns to cope with the mandatory and prolonged cohabitation necessitated by the lockdown and to discover new ways of managing the patient's cancer during the public health crisis, as suggested by colleagues (Killgore et al., 2020; Prime et al., 2020; Russell et al., 2020). It is noteworthy that family organization and interaction (FR\_FOI) also mitigates negative affect, as its standardized beta value is negative, which likely occurred because patients who perceive higher levels of family organization and interaction (FR\_FOI) manage the requirement

of the crisis more efficiently and, thus, experience more positive affect and less negative affect. Furthermore, family organization and interaction (FR\_FOI) serves as a protective factor from negative emotions, confirming previous findings indicating that positive and negative emotional states can happen during a crisis simultaneously (Fredrickson et al., 2003; Terraciano et al., 2003; Weber, 2010).

Positive states are also enhanced by the Trauma Focus Scale of PACT, which provides that the perceived ability to focus on processing the trauma focus subscale of coping flexibility (CF\_TF) is associated with positive states. The ability to focus on trauma helps personal reorganization (Comer et al., 2014; Sahar and Muzaffar, 2017), demonstrating that this result appears

to confirm that the focus on elaborating traumatic events, both individually on the trauma focus subscale of coping flexibility (CF\_TF) and as a family about organization and interaction (FR\_FOI), helps activate a more positive outlook and think realistically about COVID-19 without using strategies of denial and avoidance or feeling overwhelmed. Experiencing positive emotions in the wake of a traumatic event is particularly important, as it allows individuals to evoke powerful changes in their emotional trajectory (Fredrickson, 1998, 2000). The literature highlights how this type of coping can moderate the impact of heightened trauma exposure (Romero et al., 2015; Juanjuan et al., 2020).

As previously mentioned, family organization and interaction (FR\_FOI) is also responsible for mitigating the negative affect generated by the pandemic, which is instead enhanced by two dimensions of external locus of control: chance of locus of control (LOC\_C) and powerful of others of locus of control (LOC\_PO). When persons believe they have no control over a situation and rely on chance or others to decide how to act, they show higher levels of negative emotions. This potentially results from the perceived lack of agency in the course of their lives and could be related to a “learned helplessness condition.” Literature supports that learned helplessness affects personal resilience and distress management (Mikulincer, 1989; Smallheer et al., 2018). Learned helplessness is a consequence of a perception of scarce personal power over the situation and may result in anxiety, depression, and PTSD (Klein and Seligman, 1976; Akca, 2011; Hammack et al., 2012). This is particularly relevant since coping flexibility does not enter the model with negative affect as an outcome. Additionally, a negative locus of control may affect the ability to access personal coping abilities, which allow persons to activate strategies and tactics (Fresco et al., 2006) to individually deal with the negative event and associated negative affect. The perception of good family support and the family’s ability to autoregulate its resources may compensate for these processes of learned helplessness and aid patients through the crisis.

## CONCLUSION

These considerations are limited. The models explain 44% of the variance of positive affect and 33% of negative affect produced by the pandemic. There may be other variables that moderate or mediate positive and negative affect, such as health locus of control, dyadic support, relationship closeness, emotional carrying capacity, personality traits, and self-efficacy (Cheng, 2003; Fresco et al., 2006).

Another limitation is that affect is a time-limited outcome. It refers to an affective state that may resolve itself in a short time, and requires constant monitoring of patients to verify if especially negative affective states become more persistent as the COVID-19 crisis continues and transform into more stable psychological conditions such as distress, depression, and anxiety or into optimism and positive outlooks. For example, acute stress disorder (ASD) can occur immediately after the traumatic event and last for less than a month (Weber, 2010). Essentially, a person with ASD can present with stress reactions between 2 days and 4 weeks after experiencing a traumatic event (Smith et al., 1999).

One more limitation regarding the affect is that in this study it was not possible to measure the emotional effects of cancer alone (e.g., a baseline before the pandemic). It is not possible to clearly differentiate the emotional effects of the pandemic and of the patient’s cancer, even though the participants were asked to refer to their experience about the pandemic in the previous 15 days. Results are therefore to be taken with caution.

Future studies should also consider the contribution of demographic variables (e.g., parental and relationship status) to the emotional well-being of the patients during critical times, such as the present pandemic.

While this evidence is limited, it can be applied to structuring clinical interventions for both the present and near future as well as for avoiding more serious psychological consequences, as suggested by colleagues from Wuhan (Mei et al., 2020). Clinical psychologists should develop and propose programs to support oncology patients’ adjustment and empowerment (Bryant et al., 1999; Bailo et al., 2019), not only during stressful events but also during follow-ups for further monitoring, as suggested by an emergency psychology approach. Interventions, in particular, should address the “patients’ strategies” (Arnaboldi et al., 2020) to organize and regulate their family organization and interactions; to stay in the moment and think concretely about their choices, behaviors, and emotions during the crisis, and to make them feel more pro-active during the crisis in relation to their cancer and the crisis itself (Stephens et al., 2013; Ramezani and Gholtash, 2015; Oliveri et al., 2019b). These foci of attention could result in patients that are less prone to negative affect and are able to make more effective decisions about their cancer effectively during this pandemic.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The study was reviewed and approved by the IEO (Istituto Europeo di Oncologia) Ethics Committee (ID 2612). The patients/participants provided their informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

EB and PG run the analyses. EB, PG, and LS wrote the first draft of the manuscript. EB, PG, LS, AVG, DB, FD, and GPe contributed to the literature search. LS, AVG, DB, FD, and GPe handled the data collection. KM and GPr supervised the research. EB acted as corresponding author. All authors contributed to the ideation and design of the research and to the revisions of the manuscript.

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# Post-traumatic Growth Dimensions Differently Mediate the Relationship Between National Identity and Interpersonal Trust Among Young Adults: A Study on COVID-19 Crisis in Italy

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**Background:** In Italy, the COVID-19 pandemic has caused a collective trauma. Post-traumatic growth (PTG) has been defined as the subjective experience of positive psychological changes as a result of a traumatic event. PTG can involve changes in five psychological main dimensions: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life. In the context of national emergencies, those PTG dimensions encompassing changes at the social level (e.g., relating to others) can play a role in coping strategies that involve a renewed sense of self and one's social identities, including national identities, and in turn, foster a stronger sense of trust and connection to others.

**Aim:** To investigate how each of the five PTG dimensions mediates the association between the salience of national identity and interpersonal trust in a sample of Italian young adults. Trust in national and European institutions were expected to positively predict the strength of the Italian national identity which in turn was expected to be positively associated with interpersonal trust, and the PTG relating to others dimension to mediate this association.

**Method:** This study involves the secondary analysis of data from a representative sample of 2,000 Italian young adults (age range 18–34 years). Participants completed a web survey during the peak of the COVID-19 crisis in Italy with measures of trust in EU and national institutions, national identity, interpersonal trust, and the PTG Inventory. Structural equation modeling procedures were employed for key hypotheses tests.

**Results:** Trust in national institutions positively predicted national identity, which in turn was positively associated with interpersonal trust. Evidence of a full mediation effect of the PTG relating to others dimension on the association between national identity and interpersonal trust was found.

**Discussion:** Findings contribute to clarify the psychological responses to collective traumas. In the context of Italy's COVID-19 crisis, trust in national institutions reinforced

Italian national identity, which was in turn associated with greater interpersonal trust, but only when psychological responses to the trauma involved changes in how individuals perceived and related to others, and not merely a focus on the self. Theoretical and practical implications are discussed.

**Keywords:** COVID-19, collective trauma, social identity, national identity, post-traumatic growth, interpersonal relationships

## INTRODUCTION

Italy was among the most heavily affected countries by the COVID-19 pandemic. Since February 21, 2020, when the first case of the virus contracted by a person not coming from China was registered, the government has taken a series of increasingly restrictive measures to contain the spread of the virus. At first, restrictions were limited to specific areas but were soon extended to the whole country on March 8 when a lockdown was imposed at the national level (Governo Italiano, 2020). It was mandatory to stay at home, unless there were proven reasons of necessity. Italy was the first European country to issue such a nationwide stay-at-home order.

As of April 30, 2020, 101,551 positive cases were documented out of the 205,463 people tested positive from the beginning including 19,843 admitted to the hospital and 1,694 of which were receiving intensive care, and the death toll reached 27,967. In the provinces most affected by the pandemic, such as Bergamo and Brescia, March and April monthly mortality rates raised up to 500% as compared with the previous year. The whole country was shocked by the images from Bergamo where army trucks were moving coffins of COVID-19 victims to other regions who could no longer be accommodated into local cemeteries. All this happened in a context of isolation, fear of an unknown invisible entity, and uncertainty toward the future. At the same time, media exposure of the pandemic was overwhelmingly contributing to an increase of anxiety and depression in the population with potential traumatic effects for many (Garfin et al., 2020). At the time of writing this paper, many European countries, including Italy, are going through a second wave that reached its peak around the end of November. As of November 30, 2020, Italy has lost more than 55,000 people and 33,000 people are still hospitalized, of which 3,700 are in intensive care. The national emergency is still ongoing and lockdown measures are in place again after a relaxation in the summer.

Despite the fact that traumas are usually individual experiences, there are circumstances in which they are experienced by entire communities bringing out collective traumatic dynamics (Alexander et al., 2004). Circumstances generally include natural disasters, such as hurricanes (Lowe et al., 2013; Manove et al., 2019), earthquakes (Włodarczyk et al., 2016), and, for what concerns this work, epidemics. Given its health and social impact on the Italian population, the COVID-19 pandemic presents characteristics of a collective trauma experience. According to Kinston and Rosser (1974), this is a situation of massive collective stress. Others (Cuzzolaro and Frighi, 1998) defined an event to be traumatic when it impacts a community overall causing social, emotional, and behavioral

reactions. Crocq (1987) emphasized the characteristics of brutality and immediacy. More recently, Hirschberger (2018) highlighted the crisis of meaning that follows collective traumas. According to the author, as individual trauma changes the view of oneself and the perception of the world, collective traumas disrupt social contexts as well as intra-group and inter-group relations. Thus, the sense and meaning that people attribute to their world can be dramatically changed (Updegraff et al., 2008).

By examining the COVID-19 emergency in Italy, this paper will reflect on the psychological implications of collective trauma, both in terms of the effects of individuals' social identity at the national level and the interplay with different dimensions of personal growth in response to such trauma.

## Collective Trauma, National Identity, and Trust Toward Others

During collective traumatic experiences, community members are exposed to events that leave indelible signs in their group consciousness through the construction of new collective memories (Alexander et al., 2004). According to Tajfel and Turner (1979), these new collective memories facilitate both the formation of new social identities and the strengthening and salience of pre-existing ones. There is evidence that strong and salient identities contribute to effective coping with stressful events (Kira et al., 2019) and help in safeguarding mental health (Berzonsky, 1992) because they mediate the relationship between perceived threat and psychological well-being (Schmid and Muldoon, 2015). In other words, when their social group is threatened, people tend to strengthen their social identities which in turn play a significant role in coping processes to traumatic events and dealing with the adverse event and anxiety that results from it (Griswold et al., 2018).

National identity is the type of social identity that derives from the sense of belonging to a nation or a state (Triandafyllidou, 1998). The construction of national identity is a complex phenomenon in which many aspects of a subject's social life interact. It evolves gradually during infancy and adolescence to become an integral part of our self. National identity originates from categorization processes and allows people to differentiate between different groups of nations. The division of the world into categories permits people to distinguish between what is considered home and what is foreign, thus acquiring territorial and cultural values. National identities derive from a perception of belonging which implies cognitive, evaluative, and emotional processes, both at the individual and social level. This allows people to identify with their significant national traits, thus regulating their behavior. Through national identity, people share



beliefs, representations, and values that contribute to foster emotional bonds with compatriots (Smith, 1992).

It is important to stress that national identities may have practical implications. The consequences of the categorization process, such as the outgroup homogeneity effect and the ingroup bias, also materialize in the distinctions between the different national groups (Tajfel and Turner, 1986): one's own nation will be perceived as more varied in comparison with foreign nations, which will instead be more likely to be stereotyped. Nationalism, for example, often derives from the intergroup confrontation and breeds from favoritism toward the ingroup. Radical forms of nationalism include elevating one's nation above the others, judging it as superior, and legitimizing its dominance over the other groups. This may have consequences including discriminant behaviors and rejection toward members of other national and ethnic groups (e.g., the immigration issue in Europe) (Smith, 1992). At the same time, national identity can enhance closeness among people which in turn boosts social support. People's national identity can become salient in cases whereas during the COVID-19 pandemic, the entire nation is affected by a traumatic event involving its citizens as a whole. Facing a common internal or external, natural or biological threat is supposed to enhance people's feelings of being part of a nation (West and Smith, 1997; Guibernau, 2004). As previously stated, this national sentiment became evident during collective manifestations such as singing in the balconies and support networks' activation (e.g., volunteering, elderly care, psychological support), and contributed to people coping with the negative emotions that the situation triggered (Venuleo et al., 2020).

The idea of nation can be identified with its institutions resulting in the establishment of in-group boundaries (Jelen, 2011), and fostering a sense of belonging and national identity (Harttgen and Opfinger, 2014). According to Gibson and Condor (2009), national institutions can be considered as hybrid entities including group of peoples, material objects (buildings, places), and procedures (laws, constitutions, government measures). In times of emergency and threat, institutional representatives often emphasize the notion of "we" as a nation with the intent of strengthening people's national identity. Moreover, if people trust the government and its institutions, the sense of belonging to the most salient social group at that time, the national one, is generally stronger. In Italy, the pandemic has been managed for the most part by national institutions such as the government, the National Health System (NHS), the police, and the civil protection agency. The European Union (EU) had a relatively marginal role and it has often been considered as an entity external to the nation.

The implications of social identities in regards to relations with others have been extensively examined (Tyler, 2001; Tanis and Postmes, 2005; Voci, 2006). It has been widely acknowledged that threatening situations, such as pandemics, strengthen the salience of social identities and foster solidarity, cooperation, and norm compliance within the group (Dovidio et al., 2020). For what concerns national identity, it has been demonstrated that its salience and strength are positively related to trust toward other people and cooperative behavior, and this is especially true under

conditions of risk and uncertainty (Brewer, 2008; Ntontis and Rocha, 2020). Interpersonal trust can be considered as a positive expectation toward others' behavior (Robinson, 1996) and the sincerity of their words (Hosmer, 1995). Trust is important both during an emergency and the following period of recovery because it helps people to coexist and cooperate (Righetti and Finkenauer, 2011). In fact, as Kramer and Wei (1999) highlighted, in conditions of social identity threat, interpersonal trust is based more on common membership of the salient group (identification-based trust) rather than on individual reciprocal benefits (calculus-based trust), thus explaining the link between one's social identities and how we relate with others.

## Post-traumatic Growth

Because of its fundamental importance in mental health, trauma has been extensively analyzed in the psychology literature (Prati and Pietrantonio, 2006; Luszczynska et al., 2009). Despite the majority of studies focused on the psychopathological consequences of traumatic events at the individual level, others have examined positive psychological and social changes after trauma and adverse experiences (Linley and Joseph, 2004). Post-traumatic growth (PTG) (Tedeschi et al., 1998) has been defined as the subjective experience of positive psychological changes in the aftermath of a traumatic experience (Tedeschi and Calhoun, 1995). Importantly, PTG is not a monolithic construct, but it encompasses five distinct dimensions (Prati and Pietrantonio, 2009): changes in how people relate with others (relating to others: i.e., an increased willing to express emotions or even accepting more likely help from others), recognition of new possibilities (new possibilities: i.e., seen as an increased attitude to take new paths in life and redefine priorities), a sense of greater personal strength (personal strength: i.e., improved sense of self-efficacy, strength, and self-confidence), changes toward spirituality (spiritual change: i.e., religious beliefs, spiritual matters, and existential/philosophical questions), and greater appreciation of life (appreciation of life: i.e., considering meaningful and worth in life's little things).

Some studies (Wasco et al., 2002; Cacioppo et al., 2015) highlighted how a collective experience of trauma can help people reflect on their traumatic experiences and consequently learn from them. Social identities are involved in this process (Calhoun and Tedeschi, 2012; Tedeschi et al., 2018; Muldoon et al., 2019): a renewed sense of belonging to a group or community, including the national level, significantly contributes to the meaning-making process. In turn, it is crucial for the positive processing of trauma and its implications in terms of social interactions, which include increased self-disclosure and trust within social relationships.

In summary, it has been established that social identities, including the national level, have implications in regard to how individuals relate to others and put their trust into them. What is lacking is a deeper understanding of the interplay between social identities and PTG in determining such coping responses to emergency situations that involve the social sphere. Importantly, despite its multidimensional nature that encompasses both individual and social aspects, the PTG has generally been examined in the literature as a unique dimension. This may have

resulted in overlooking the role of each specific dimension. Those dimensions encompassing changes at the social level (i.e., the relating to others dimension) may play a role in the connection between social identities and responses of trust toward others, whereas the other dimensions involving changes at the individual level (e.g., personal strength) may not.

## Aims

This study investigated how each of the five post-traumatic growth dimensions mediates the association between the salience of national identity and interpersonal trust in a sample of Italian young adults. Trust in national and European institutions were expected to positively predict the strength of the Italian national identity (Hypothesis 1), which in turn was expected to be positively associated with interpersonal trust, and the PTG relating to others dimension to mediate this association (Hypothesis 2). Because the other PTG dimensions involve changes at the individual level (i.e., personal strength and appreciation of life, new possibilities, and spiritual change), they were expected to play a less significant role (Hypothesis 3). **Figure 1** depicts the overall conceptual model.

## MATERIALS AND METHODS

### Data

This study involves the secondary analysis of data collected by the Osservatorio Giovani of the Istituto Toniolo di Studi Superiori (Milan, Italy). Since 2012, the Osservatorio conducts yearly computer-assisted web interview (CAWI) surveys regarding topics related to young people, such as social and economic inclusion of people that are Not in Employment, Education, or Training (NEET), as well as healthy behaviors, cultural issues, and participation (Alfieri et al., 2015; Marta et al., 2016; Aresi et al., 2018, 2020; Pistoni et al., 2019). The authors contributed to the design of the major study. Sampling and data collection were conducted by Ipsos s.r.l. between March 27 and March 31, 2020 during the peak of the COVID-19 crisis in Italy. Out of 4,116 contacts, a sample of 2,000 responders was achieved to be representative of the Italian young adult (18 to 34 years old) population in respect of several sociodemographic characteristics including gender, age range, educational level, occupation status, and geographic area (Istituto Nazionale di Statistica, 2020). About half (49%) of the respondents were female and mean age was 27.1 (SD = 4.69). The sample consisted of the following age ranges: 18–22 (19.3%,  $N = 387$ ), 23–25 (18.9%,  $N = 379$ ), 26–28 (19.9%,  $N = 398$ ), 29–31 (19.9%,  $N = 398$ ), and 32–34 (21.9%,  $N = 438$ ). Participants' occupation status was distributed as follows: 54.3% workers, 36.9% students, and 8.9% unemployed. In terms of geographic area, 24.8% lived in the Northwestern, 17.8% in the Northeastern, 19.2% in the Central, and 38.2% in the Southern region.

### Measures

#### Trust in National Institutions

Trust in institutions was measured by asking: "Since the beginning of COVID-19 emergency how has your confidence

in these institutions changed?" A 5-point Likert scale was used with values ranging from 1 ("Strongly increased") to 5 ("Strongly decreased"). Scores were reversed before data analysis. The following institutions were considered: the government, the NHS, the police, the civil protection agency, and the EU.

#### National Identity

To assess Italian national identity, the In-Group Identification Scale was adapted (La Barbera and Capone, 2016). Specifically, the sub-scales Satisfaction (four items), Solidarity (three items), and Centrality (three items) were used. Items were rated using a 10-point Likert scale with values ranging from 1 ("Totally disagree") to 10 ("Totally agree"). Examples of items are as follows: "I'm glad to be Italian" (Satisfaction); "I feel committed to Italians" (Solidarity); "The fact that I'm Italian is an important part of my identity" (Centrality). All three subscales were of high reliability: Satisfaction ( $\alpha = 0.81$ ); Solidarity ( $\alpha = 0.79$ ); Centrality ( $\alpha = 0.79$ ).

#### Post-traumatic Growth

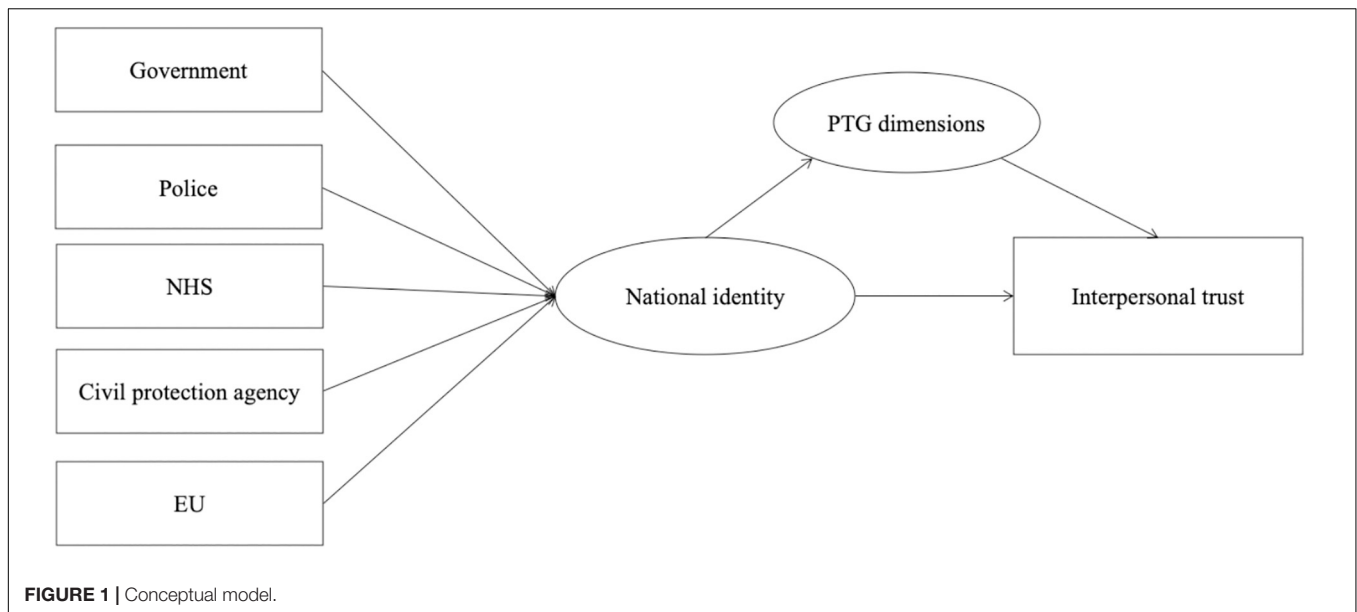
To measure post-traumatic growth, the Italian version of the PTG Inventory (PTGI) was used (PTGI; Prati and Pietrantonio, 2014). The scale has demonstrated construct validity. It consists of five subscales measuring perceptions of trauma-induced changes in (1) relating to others (example of item: "I learned a great deal about how wonderful people are"), (2) new possibilities (example of item: "I developed new interests"), (3) personal strength (example of item: "I have a greater feeling of self-reliance"), (4) spiritual change (example of item: "I have a better understanding of spiritual matters"), and (5) appreciation of life (example of item: "I have a greater appreciation for the value of my own life"). Respondents were prompted by asking "Compared to before the COVID-19 emergency, how has your position changed today with respect to the following statements?" Items were rated using a 5-point Likert scale with values ranging from 1 ("Much less than before") to 5 ("Much more than before"), and 3 considered the midpoint ("No changes"). In the validation study, the PTGI showed acceptable reliability for both the total score ( $\alpha = 0.93$ ) and the subscales, with Cronbach's alphas for the subscales relating to others ( $\alpha = 0.86$ ), new possibilities ( $\alpha = 0.84$ ), personal strength ( $\alpha = 0.80$ ), spiritual change ( $\alpha = 0.78$ ), and appreciation of life ( $\alpha = 0.74$ ).

#### Interpersonal Trust

A single item adapted from Zmerli and Newton (2008) was used to measure levels of interpersonal trust: "Since the start of COVID-19 emergency, how has your attitude toward this statement changed? Most people are trustworthy". A 5-point Likert scale was used with values ranging from 1 ("Strongly increased") to 5 ("Strongly decreased"). Scores were reversed before data analysis.

### Data Analysis

Descriptive statistics (mean and proportions) were calculated, and the data were checked for normality. We analyzed the construct validity (i.e., measurement model) of the Italian national identity and the five PTG dimensions



through confirmatory factor analysis. In accordance with the hypothesized conceptual model, we performed structural equation modeling to investigate predictors of national identity and the relationship between the latter and interpersonal trust. The mediating effect of each of the five PTG dimensions was tested using the accelerated-bias-corrected bootstrap estimation procedure, which yields the most accurate confidence intervals (CIs) for the indirect effects (MacKinnon et al., 2004). In the procedure, the given sample size was randomly resampled 10,000 times with replacement, and then 10,000 estimations of the indirect effect were calculated. When the 95% CI for an indirect effect did not include zero, the indirect effect was significant. The overall fit of the model was evaluated considering the values for acceptable absolute, relative, and parsimony fit indices. Selection of these indices was based on their statistical power and widespread use in relevant statistical literature (Hu and Bentler, 1999; Ullman, 2006; Kline, 2011). As indicative of absolute fit, we considered the root mean square error of approximation (RMSEA < 0.08) and the standardized root mean square residual (SRMR < 0.08). As a relative fit index, we used the values of the comparative fit index (CFI > 0.90) and the Tucker–Lewis index (TLI > 0.90) (Hu and Bentler, 1999; Ullman, 2006; Kline, 2011). Mplus version 7 (Muthén and Muthén, 1998–2015) was used to analyze data.

## RESULTS

### Descriptive Statistics and Measurement Model

**Table 1** displays the means, SDs and correlations among measured variables. In our sample, we found medium to high levels of national identity. This is comparable with those found by La Barbera and Capone (2016). In regard to PTG dimensions,

we found that scores of “appreciation of life” were the greatest and of “spiritual change” the lowest. The result on the latter dimension is consistent with the validation study, although Prati and Pietrantonio (2014) found that the “relating to others” dimension scored the highest.

The data showed a normal univariate distribution, given that most skewness values and kurtosis values fell within the range of  $-1.0$  to  $+1.0$ . As hypothesized, national identity scores were positively related to interpersonal trust and the five PTG dimensions. In addition, each PTG dimension was positively associated with interpersonal trust.

The measurement model for the six latent variables (national identity and the five PTG dimensions) was tested, and the results revealed an acceptable fit to the data: [ $\chi^2(419) = 2,111.028, p < 0.001, CFI = 0.948, TLI = 0.942, RMSEA = 0.045, SRMR = 0.031$ ]. All the standardized factor loadings for the indicators on the latent variables were statistically significant ( $|\lambda|$  ranging from 0.55 to 0.87,  $ps < 0.001$ ), signifying that the six latent variables were well represented by their respective indicators. Given the adequacy of the measurement model, the structural model was examined next.

### Structural Model and Mediation Analyses

The structural model was estimated modeling trust in the EU and the four national institutions as predictors of national identity, and national identity as a predictor of interpersonal trust as the outcome variable. The indices in the estimated model revealed an acceptable fit for the observed data (CFI = 0.944; TLI = 0.934; RMSEA = 0.075; SRMS = 0.029). As presented in **Figure 2**, trust in national institutions, except the civil protection agency, positively predicted national identity. Conversely, trust in EU institutions negatively predicted national identity. Thus, Hypothesis 1 was partially confirmed. The effect of national identity on interpersonal trust was positive and significant ( $\beta = 0.167, p < 0.001$ ).

We conducted five separate models to examine whether each of the five PTG dimensions would serve singly as a mediator in the relationship between national identity and interpersonal trust (Figure 3). All models evidenced an acceptable fit to the data. The results showed that the PTG relating to others, perceptions of having new possibilities, and spiritual change dimensions mediated the positive relationship between national identity and interpersonal trust, whereas personal strength and appreciation of life did not (both indirect effects were not significant). The indirect effect of the relating with others dimension on interpersonal trust was significant [indirect effect = 0.99,  $p < 0.001$ , 99% CI = (0.061, 0.136)], as well as that of perceptions of having new possibilities [indirect effect = 0.33,  $p < 0.01$ , 99% CI = (0.005, 0.061)] and spiritual change [indirect effect = 0.33,  $p < 0.01$ , 99% CI = (0.08, 0.058)]. In regard to the relating with others dimension, inspection of CIs suggests that, despite the direct effect of national identity on interpersonal trust remained significant at a 0.05  $p$ -value [ $\beta = 0.068$ ,  $p < 0.05$ , 99% CI = (-0.002, 0.138)], it was markedly decreased and CIs overlapped zero. Therefore, this mediation can be considered full (Hypothesis 2). Conversely, after accounting for the mediating effect of perceptions of having new possibilities

and spiritual change dimensions, the direct effect was only slightly decreased and CIs did not include zero [ $\beta = 0.134$ ,  $p < 0.001$ , 99% CI = (0.065, 0.202),  $\beta = 0.133$ ,  $p < 0.001$ , 99% CI = (0.067, 0.200), respectively]. Thus, these are partial mediations (Hypothesis 3).

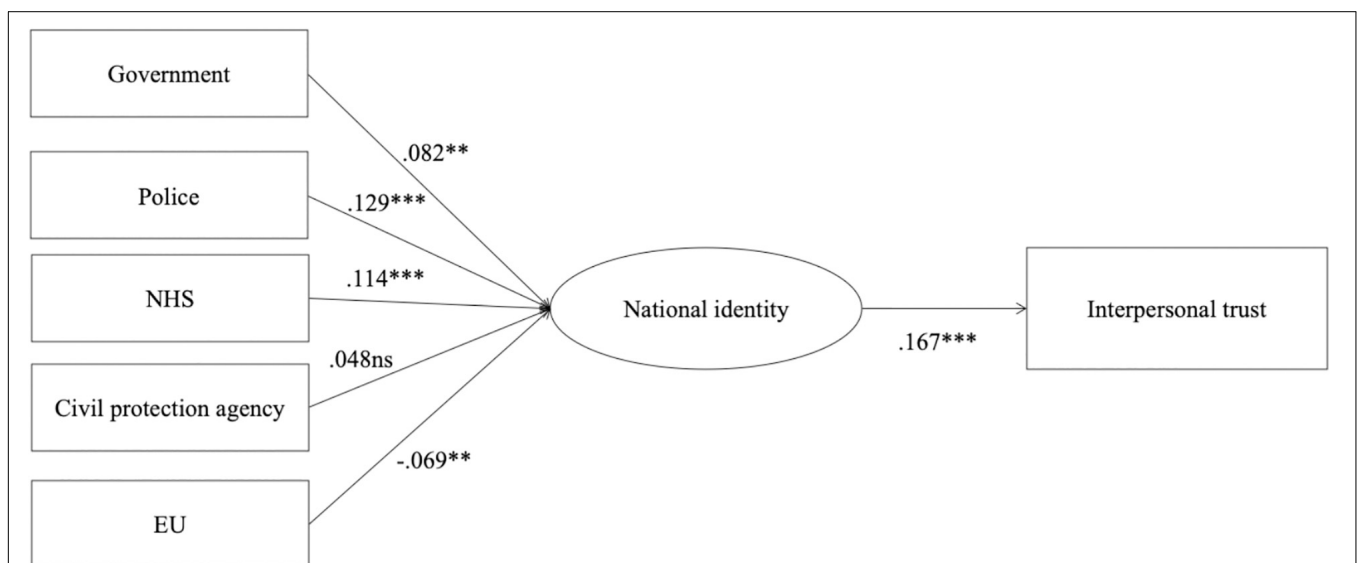
## DISCUSSION

This work has examined some implications of the COVID-19 pandemic in Italy from a social identity perspective. Given the collective nature of this public health emergency, national identity was expected to be salient and to be involved in coping processes that included cooperative behavior and trust toward other people (Griswold et al., 2018; Kira et al., 2019; Dovidio et al., 2020). During the first weeks of the health crisis, feelings of national identity were manifested through people hanging national flags on balconies and performing traditional Italian music out of their windows with neighbors. These expressions can be considered a way of reacting to the anxiety and fear that the epidemic was evoking, thus highlighting the coping strategy feature of the shared social identity (Haslam et al., 2014). The

**TABLE 1** | Descriptive statistics and correlations between measured variables.

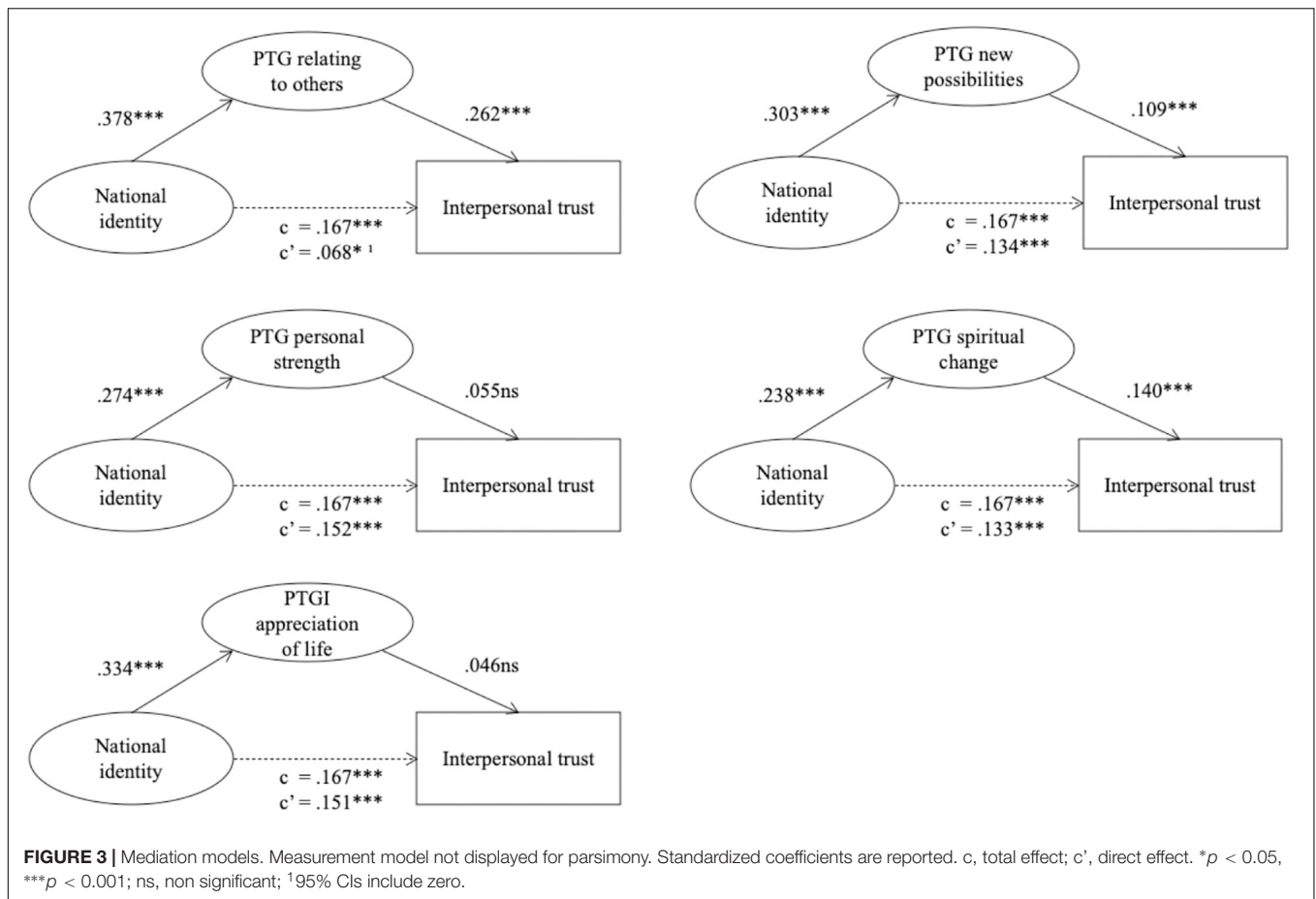
Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. National identity	6.40	2.01	–						
2. Interpersonal trust	2.76	0.89	0.171***	–					
3. PTG relating to others	3.23	0.56	0.326***	0.238***	–				
4. PTG new possibilities	3.30	0.56	0.247***	0.129***	0.634***	–			
5. PTG personal strength	3.31	0.61	0.231***	0.075**	0.558***	0.681***	–		
6. PTG spiritual change	2.97	0.76	0.181***	0.124***	0.409***	0.282***	0.227***	–	
7. PTG appreciation of life	3.47	0.65	0.280***	0.073*	0.559***	0.648***	0.594***	0.238***	–

$N = 2,000$ , \* $p > 0.05$ , \*\* $p > 0.01$ , \*\*\* $p > 0.001$ .



**FIGURE 2** | Structural model. Measurement model not displayed for parsimony. Standardized coefficients are reported. \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , ns, non significant.





more people feel part of a group, the more capable they feel of facing adversities (Scarf et al., 2016).

First, our study indicates which aspects of their life and personal growth people gave the most thoughtful attention to during the first phase of the health emergency. The “appreciation of life” dimension received the highest score and “spiritual change” the lowest. We speculate that this is because the virus represented a threat to people’s health and was potentially fatal, thus accentuating concerns about one’s life and physical integrity. Spirituality was involved to a lower extent. The literature presents mixed findings on this matter. On the one hand, because the COVID-19 pandemic significantly altered the standard way of life, people may have been more prone to reflect on spiritual matters, thus allowing spirituality to be a resource to cope with stress (del Castillo, 2020). On the other hand, according to a new Pew Research Center survey (Gecewicz, 2020), a minority of people have changed their spirituality or religious behavior during the health emergency so far. We can hypothesize that for young people to reflect on spiritual issues, such as life’s meaning, requires more complex processes and more time than an immediate greater “appreciation of life” would require. Longitudinal data could offer insight on whether, after the turmoil of the pandemic’s first phase, young people have reflected on their spirituality to a greater

extent. Interestingly and contrary to previous studies (Prati and Pietrantonio, 2014), we found the “relating to others” dimension scored the lowest. This result is likely to be due to the substantial reduction of social interactions that people experienced during the lockdown.

For what concern national identity, our results confirm the importance of the national identity by the clear distinction between feelings toward national and supranational (i.e., the EU) institutions. The greater the trust in the Italian government and national institutions highly involved in the management of the crisis was, the feelings of national identity increased. However, the opposite was found for the EU suggesting that trust in this supranational institution clashed with feelings of “we” as a nation. In light of Italians’ ambivalent feelings toward the EU, this institution was perceived as an external entity that did little to support Italy during the emergency and was therefore considered an outgroup by most Italians (Laflan, 2004). This was likely to be further accentuated by the fact that during the first weeks of the pandemic, the media in other European countries portrayed the Italian government and national health system as culpably unprepared to cope with the virus, thus strengthening in-group boundaries increasing the gap between an “us” (ingroup) and a “them” (outgroup) (Jelen, 2011). In other words, these conjoint factors strengthened the salience of a social identity as Italians and

in its national institutions in contrast to supranational ones (Ruiz Jiménez et al., 2004; Harttgen and Opfinger, 2014). To promote national identity as a resource capable of conveying feelings of belonging, union, closeness, and solidarity, institutions could communicate an all-encompassing and supportive idea of “us,” and avoid evoking feelings of hate, discrimination, and fear for the “other.” As such, national identity would become an asset and not an obstacle for cooperation, allowing people to manage fear and anxiety by building networks, including virtual ones, and participating in collective events based on positive values. The result would likely be greater reflexivity on the health emergency and its social and psychological consequences, possibly accompanied by greater psychological growth (Venuleo et al., 2020).

By indicating that social identity salience can lead to a more generalized trust in interpersonal relationships in an emergency context, our findings are consistent with those of previous studies on this issue (Brewer, 2008; Ntontis and Rocha, 2020). Their novelty lies in the nuanced examination of the mediation role in this association played by each of the five post-traumatic growth dimensions.

Four out of the five PTG dimensions appear to be at best weakly involved, and the most “social” dimension (i.e., relating to others) only fully mediated the national identity—interpersonal trust association. This means that without a re-attribution of meaning to one’s relationships with others, renewed social identities do not result in positive changes in how people relate with others. In other words, trust in interpersonal relationships does not come automatically from salient social identities, but is the outcome of a meaning-making process whereby people go through a process of reflection and growth, especially when it comes to relationships with others (Muldoon et al., 2019). Furthermore, because collective traumas affect social bonds, during emergencies where other people can be considered a threat (in this specific case: a source of contagion), understanding that they can be part of the solution and not part of the problem is fundamental to cope with it.

In regard to the other PTG dimensions, a renewed spirituality and the perception of having new possibilities in life demonstrated to have a partial and modest role in mediating the association between national identity and trust toward others. We speculate that changes in these dimensions may involve the way people see others and the relationships they establish with them, i.e., seeing others as brothers and sisters in a religious community, thus explaining this effect of partial mediation (Tedeschi et al., 2018). Both PTG dimensions of personal strength and appreciation of life include changes closely related to the individuality of each person, i.e., the perception of being stronger and able to better accept negative things, as well as the value that people give to their lives and the ability to appreciate the positives of every day (Tedeschi et al., 1998). Despite these positive outcomes of the process of personal growth after a traumatic experience, we have demonstrated that they do not play a significant role in reshaping how people see others and relate with them.

## Limitations

The present study contains some limitations that are noteworthy, the most important being its cross-sectional nature. Further research with longitudinal designs is needed to better examine the causal relationships and mediation effects. Besides, this study did not consider the variables that can promote post-traumatic growth which are necessary to understand better the design of clinical and community interventions that create psychological well-being. Lastly, data of this study came from a sample of Italian young adults and it is unclear to what extent results encompass other age cohorts and countries in Europe.

## Conclusion

Findings of this study contribute to the literature by providing empirical evidence to the notion that, in a collective emergency and trauma context, the salience of national social identities is related to a more generalized trust in interpersonal relationships. This can also be understood from the perspective of living a “common fate” in the face of mortal danger and can determine a growth in a more relational and prosocial dimension, which in turn impacts on general trust toward others and consequently on well-being (Haslam et al., 2014).

Results of this study have implications for the work of social and clinical psychologists. Reinforcing positive identities through psychosocial interventions and consultation can be the basis for psychological growth at an individual and community level (Haslam et al., 2008; Yakushko et al., 2008; Alexander Haslam, 2014). This is because salient and positive social identities offer greater access to solidarity and social support (Muldoon et al., 2019), and play a protective role toward stressors resulting in more favorable psychological outcomes (Zoellner and Maercker, 2006). Those who have experienced trauma affirm that they need to express their feelings and confide their emotions to someone (Lehman et al., 1986), and there is evidence that sharing thoughts about traumatic experiences with others contribute to a better post-traumatic adjustment and more favorable outcomes (Pennebaker, 1989, 1993). Moreover, having valid social support appears to be a predictor of post-traumatic growth which in turn represents a healthy way to respond to trauma (Nolen-Hoeksema and Davis, 1999; Lev-Wiesel et al., 2004; Ramos and Leal, 2013). On this basis, it seems crucial to raise clinician awareness of the possibility of growth to encourage the development of those elements that predict the outcome in clinical practice.

## DATA AVAILABILITY STATEMENT

The data analyzed in this study is subject to the following licenses/restrictions: The data underlying this article were provided by Osservatorio Giovani© of the Istituto Toniolo di Studi Superiori©, and will be shared on request to the corresponding author with permission of the Osservatorio. Requests to access these datasets should be directed to corresponding author.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Osservatorio Giovani© of the Istituto Toniolo di Studi Superiori©. The patients/participants provided their written informed consent to participate in this study.

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## AUTHOR CONTRIBUTIONS

AE, MP, and EM designed the study. GA analyzed the data. AE and GA wrote the manuscript. MP and EM contributed to revisions. All authors read and approved the final manuscript.

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# Influence of Empathy Disposition and Risk Perception on the Psychological Impact of Lockdown During the Coronavirus Disease Pandemic Outbreak

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During the current COVID-19 pandemic, and especially in the absence of availability of an effective treatment or a vaccine, the main health measure is neither chemical nor biological, but behavioral. To reduce the exponential growth of infections due to the new coronavirus (SARS-CoV-2) and the resulting overburdening of the healthcare system, many European Countries, parts of the US and Switzerland gradually implemented measures of quarantine and isolation defined as lockdown. This consideration leads to the need to understand how individuals are motivated to protect themselves and others. Recent research suggested that prosocial mental dispositions, such as empathy, might promote adherence to social norms of distancing. Other research conducted during the COVID-19 outbreak indicates, however, that empathy levels might fluctuate according to anxiety linked to the risk of death, and this negatively predicted prosocial willingness. The present protocol proposes a study on whether people's empathic dispositions, interacting with the levels of risk, influence the psychological impact of lockdown. The rationale is that emphatic dispositions, encouraging the acceptance of the lockdown, determine a better psychological adaptation and less distress. One retrospective study will be developed in Switzerland and, if the pandemic conditions force a new wave of lockdown on the population, one prospective study as well. A total of 120 participants will be involved, distinguished by their level of objective risk: (1) high objective risk (COVID-19 positive patients, hospitalized in isolation in post-acute phase); (2) moderate objective risk (COVID-19 positive patients, isolated at home); (3) minimum objective risk (non-positive adults, in lockdown). Measures of perceived risk of being contagious for third parties, empathic dispositions and acceptance of lockdown will be collected. The expected results provide important answers related to the immediate impact of empathic dispositions, effective risk and risk perception on the psychological impact of lockdown during a pandemic outbreak. Data gathered from this study could inform policy makers

and public health managers about the best communication strategies that will take into account the various stages of health risk and, in particular, to modulate messages to the population aimed at inducing self-isolation behaviors.

**Keywords: COVID-19, isolation, lockdown, psychological distress, risk, empathy, prosocial, ethics**

## INTRODUCTION

In December 2019, originating in Wuhan, China, a new coronavirus disease (COVID-19) emerged which led to an epidemic of an acute respiratory syndrome (SARS-CoV-2). Within 3 months, the virus had caused more than 118,000 cases and resulted in 4,291 deaths in 114 countries, leading the World Health Organization to declare a global pandemic. The pandemic has led to a massive global effort by local health systems to deal with the cases of infection and to reduce the number of deaths. The most common and useful preventive measures require an increase in hygiene practices (e.g., frequent hand washing, reducing face touching, use of tissues, sanitization of environments). However, in most cases, these measures have not been sufficient, and COVID-19 has forced people to change their habits, from wearing masks in public to physical or social distancing.

On February 24, 2020, Switzerland registered the first case of COVID-19 infection in Canton Ticino, the Italian-speaking part of the country. The number of positive cases increased rapidly in the following days, as did the number of deaths. Three months later, there were 358 confirmed laboratory cases and 19 deaths per 100,000 of the population in Switzerland (1). Neighboring Italy, one of the countries worst affected by the coronavirus, announced 380 confirmed cases and 54 deaths per 100,000 of the population (2). To reduce the exponential growth of infections and the resulting overburdening of the healthcare system, the Swiss Federal Government, like many European Countries and parts of the US, gradually implemented measures to restrict individual freedom (i.e., lockdown for non-health workers).

Other more restrictive measures were implemented in Canton Ticino because of the faster spread of the virus (with an incidence of 958/100,000 confirmed cases on May 25, 2020) due to the proximity of the region with the most affected area of Italy. At first, when the pandemic started to spread across Canton Ticino, contact-tracing measures were applied. Then, when the number of infections increased, those who presented any kind of symptom attributable to the coronavirus infection and people who came into contact with a suspected or positive case of COVID-19 were asked to quarantine at home. Positive COVID-19 patients were isolated either at home or, if so required by their health conditions, in special hospital wards dedicated to COVID-19. For the over-65s, the population group most affected by the virus, the Ticino government strongly recommended not leaving their homes. Care homes were closed to the public. At the end of April, the quarantine and physical distancing measures for non-infected people were progressively reduced in most countries, including Switzerland. Contact tracing and selective isolation in case of contact with a positive case of COVID-19

were re-established for the Swiss population. In the meantime, the scientific community started to fight against COVID-19. Laboratories and researchers in every part of the world have been testing pharmaceutical interventions for COVID-19 [see (3, 4)].

Social behavioral and psychological research has been studying the impact of the pandemic on individuals' well-being and psychosocial functioning. A rapid review of the studies carried out during previous pandemics (e.g., SARS, Ebola, H1N1 influenza) revealed a negative psychological impact on the general population generated by physical isolation and quarantine (5). Short-term effects involved emotional disorders, anxiety, depression, stress, mood decline, irritability, insomnia and PTSD. Whereas long-term effects included increased depressive symptoms, addiction symptoms (i.e., alcohol consumption, substance use) and persistence of avoidance behaviors. The same authors found that the psychological impact of the restrictive measures was boosted by the duration of the quarantine, existing psychiatric disorders, infection fears, financial loss and loss of accessibility to necessities or daily routines, and insufficient information. These pre-COVID-19 results have also been confirmed by further systematic review and meta-analysis of mixed lists of diseases prioritized in public health emergencies (6, 7). This evidence tends to be confirmed by research on confinement conducted during the COVID-19 outbreak (8, 9). Ammar et al. (8) insist on a crisis-oriented interdisciplinary intervention and Serafini et al. (9) suggest focusing on identified protective factors such as resilience and social support or preventive strategies such as effective communication and the provision of adequate psychological services. Public health condition during the epidemic have been acknowledged as a major stressor contributing to an increased risk of psychiatric illness (10). Likewise, regional data on the general population published in Italy highlight the fact that vulnerable people may experience distress during lockdown (11–15).

Evidence emerging from literature has stimulated a debate on what aspects may protect individuals from the negative side-effects of quarantine and isolation. There is a growing body of evidence about communication features that might contribute to mitigating the psychological impact of isolation/quarantine during pandemic outbreaks. To this end, the five review has identified five key public health measures: reducing quarantine duration, providing adequate supplies, providing information, improving communication, protecting vulnerable groups and promoting altruism. These authors also recommend that "public health officials should emphasize the altruistic choice of self-isolating" [5, p. 1].

People's willingness to adhere to preventive public health behaviors is known to be associated with risk perception, which is influenced during the COVID-19 outbreak by various social factors among which are prosocial attitudes (16, 17). Prosocial dispositions have been particularly identified as a core factor in reducing the psychological impact of quarantine during previous pandemic outbreaks (18, 19), and are at the center of an emerging field of research in this domain for adapting public health messages. A recent study in the US (20) confirmed the need for promoting prosocial values: compared to messages that induce fear, prosocial messages capable of arousing a positive emotional state have proved to be more effective in the willingness to accept self-isolation. Another recent study (21) suggests that prosocial mental dispositions, such as empathy, might promote adherence to social norms of distancing, hygiene practices, and ultimately may influence the psychological impact of measures restricting individual freedom. The emphasized rationale is that engaging in physical and social distancing not only protects oneself but also others, especially the most vulnerable, and in this sense is a prosocial behavior. Following this principle, Pfattheicher and colleagues, comparing people from three different countries, demonstrated that empathy increased the motivation for physical distancing.

Other research conducted during the COVID-19 outbreak indicates, however, that empathy levels might fluctuate according to anxiety linked to the risk of death, and this could modulate prosocial willingness (22–25). Perceived risk of infection have been found to be higher in individuals leaving in locations with higher H1N1 incidence and likely to influence the adherence to disease control measures (26). Research on the domain of vaccination for influenza demonstrated that both subjective and objective risk perception were associated with the propensity to take the vaccine (27). Therefore, it seems that, together with empathy, objective and perceived risk may be a variable influencing the adherence to behavioral measures. Perceived risk may be relative to the individual, in other words concern associated with one's own health and survival, which can be experienced by both individuals with or without symptoms. However, the perceived risk can also be relative to third parties: the perception of being a danger to relatives, friends or even simple acquaintances, which again can be experienced by both infected or non-infected individuals.

There are no studies to date that have analyzed whether people's empathic dispositions, interacting with the levels of risk, influence the psychological impact of quarantine/isolation. The rationale that underlines this is that empathic dispositions, encouraging the acceptance of the quarantine, determine a better psychological adaptation and less distress. On the other side, a high subjective risk perception and a high objective risk should increase the negative psychological impacts of the lockdown because the negative feelings and the emotional concerns caused by the uncertainty of the situation. It might also be that the empathic disposition and the objective and subjective risk interact each other in determining the psychological impacts of the lockdown. For clarity of terminology, the term quarantine/isolation has been replaced by lockdown, which is currently used in the

international and local media to refer to collective physical and social distancing or isolation during a health emergency.

In particular, the following hypotheses and research questions will be tested:

HP1: high empathic dispositions (vs. low) are associated with the positive psychological impact of the lockdown directly (HP1a) and through the mediation of the acceptance of the lockdown (HP1b).

HP2: high subjective risk perception and high objective risk, independently, are associated with the negative psychological impact of the lockdown.

RQ1: what are the interrelations between risk perception and empathic dispositions on the psychological impact of the lockdown?

RQ2: to what extent does objective risk in combination with empathic dispositions predict the psychological impact of the lockdown?

Figure 1 shows the model tested.

## METHODS

This research will take place in Switzerland, specifically in Canton Ticino. The aim will be to measure the effects of the interaction between empathic dispositions and perceived or objective health risk on the psychological impact of lockdown during the COVID-19 outbreak. One retrospective study will be developed and, if the pandemic conditions force a new wave of lockdown on the population, one prospective study will be also developed. The two studies share the same hypotheses and method.

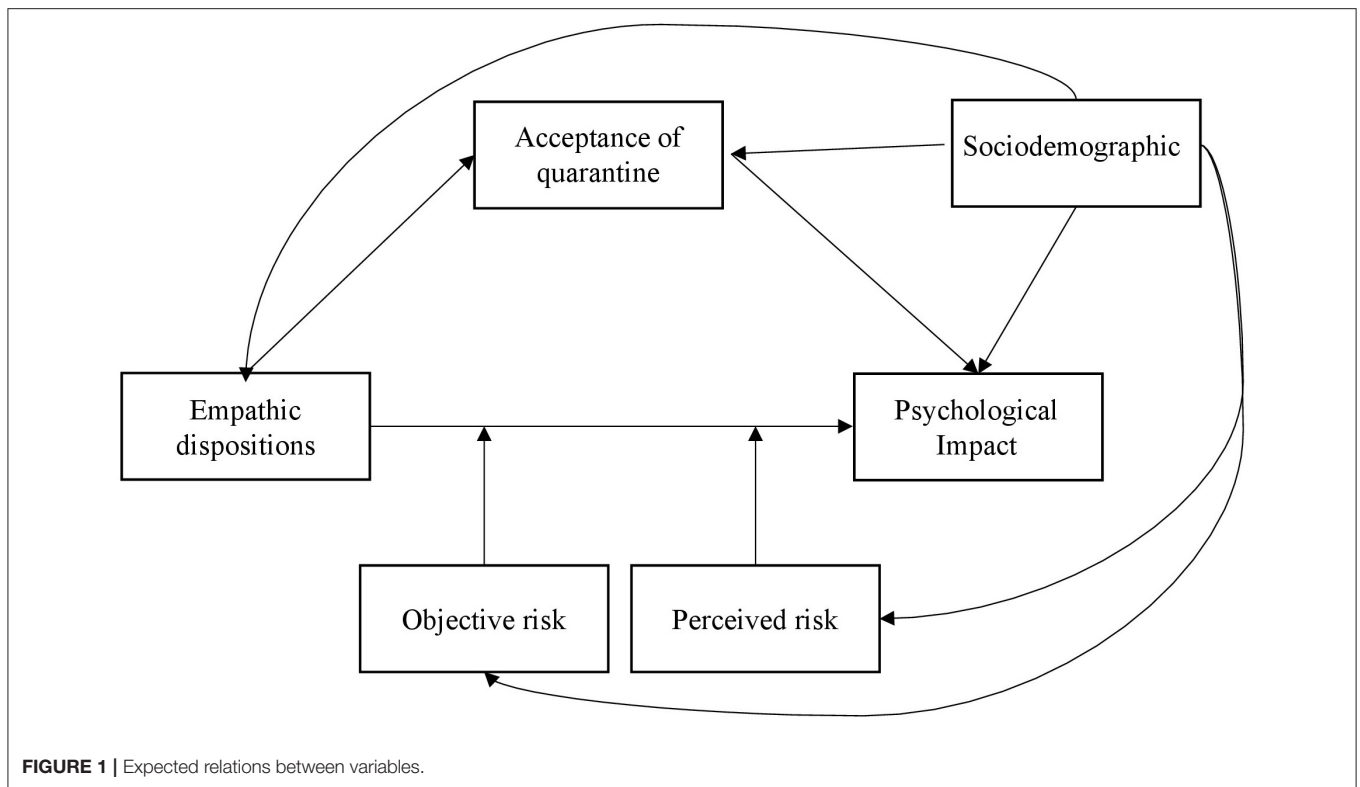
## Participants

A total of 120 participants will be involved in the research. The number of participants has been calculated based on an a-priori statistical estimate (applying GPower v.4), which guarantees adequate statistical power. Retrospective and Prospective studies will involve three groups of participants:

- Group 1: High objective risk ( $n = 60$ ): patients over 18 years of age, tested positive for COVID-19 and hospitalized in isolation in post-acute phase.
- Group 2: Moderate objective risk ( $n = 60$ ): patients over 18 years of age, tested positive for COVID-19 and isolated at home.
- Group 3 (control group): Minimum objective risk ( $n = 60$ ): control group. Persons over 18 years of age, not positive for COVID-19 and in preventive social and physical isolation at home (lockdown).

## Procedure

COVID-19 patients will be recruited through local hospital database on COVID-19 cases provided by Ente Ospedaliero Cantonale (Cantonal Hospital Authority). Participants will complete the survey via a Qualtrics™ online link or by paper and pencil. In the retrospective study, participants in groups 1 and 2 will be contacted by phone and will receive the informed consent and questionnaires by post. In the prospective study, group 1 will be contacted directly in the ward and will receive the



informed consent and questionnaires to fill out. Group 2 will be contacted by phone and will receive the informed consent and questionnaires by post. Group 3 will be recruited by snowball sampling and data collection will be via Qualtrics™ online link.

## Measures

**Demographic.** Self-reported gender, age, living area, marital status, occupation, household composition, will be collected through medical files in EOC's database for Groups 1 and 2 and through specific questions for Group 3.

**Previous health problems.** Self-reported previous diagnosis of non-COVID-19 diseases and/or psychiatric disorder will be collected through medical files in EOC's database for Groups 1 and 2 and through specific questions for Group 3.

**Effective risk exposure (COVID-19 status).** Participants' COVID-19 status or presence of symptoms attributable to COVID-19 will be collected through medical files in EOC's database for Groups 1 and 2 and through specific questions for Group 3. Questions on COVID-19 status of the household, situation of risk in the household and duration of isolation will be also asked.

**Perceived risk.** One item developed *ad hoc* for this research will evaluate the individual's perception of risk of being contagious for third parties. The item will be formulated according to the measures of perceived relative risk applied in literature [see (28)]. Response options vary from 0 ("no risk") to 10 ("maximum risk").

**Empathic dispositions.** Empathic disposition will be measured with three items translated from Pfattheicher et al. (2020).

Response options range from 1 ("strongly disagree") to 5 ("strongly agree"). The items measuring empathy are mixed with three-filler items to reduce demand characteristics.

**Acceptance of lockdown.** Three items will be developed *ad hoc* for this research evaluating participants' acceptance of social and physical isolation measures (lockdown). The item will be formulated according to the measure of physical distancing practice used by Pfattheicher et al. (2020). Labels ranged from 1 ("strongly disagree") to 5 ("strongly agree").

**Psychological impact of lockdown (or Distress).** Psychological impact of lockdown (i.e., Distress) will be investigated with the Italian version of the NCCN Distress Thermometer without the Problem List (available at: <https://www.nccn.org/about/permissions/thermometer.aspx>) (29), Patient Health Questionnaire-9 (PHQ-9) (30) and the Generalized Anxiety Disorder 7-item Scale (GAD-7) (31). For both questionnaires, participants indicate how often they have been troubled during lockdown by each symptom, using a four-point Likert scale ranging from 0 ("Not at all") to 3 ("Nearly every day").

## Data Analysis

Data will be analyzed through Reliability Analysis, Anova and Ancova, Moderation and Mediation Analysis.

## Ethical Considerations

The study was reviewed and approved by the Cantonal Ethics Committee (N. 2020-01460 /CE3679). Participation is voluntary. All data will be collected and analyzed



in an anonymous form. Participants will be debriefed after the experiment. Data will be treated confidentially and used only by the collaborators in the present study for scientific purposes. Participants will receive a written informed consent and will give their consent for their participation.

Evaluating the basic psychological status associated with lockdown during coronavirus could enhance participants awareness of their mental health. The local public psychiatric organization number is included in the Study presentation form. Facilitating access to specific mental health care could be seen as a possible direct benefit for participants in this study.

## DISCUSSION

During a worldwide health risk situation like the one we are facing with COVID-19, especially if effective treatments or vaccines are not yet available for all, the main health measure is neither chemical nor biological, but behavioral. Prosocial behaviors are particularly solicited from the general population when lockdown measures force people to restrict personal freedom and sustain socio-economic and psychological burdens. The results of the present research will provide important answers related to the role of empathic dispositions, objective risk and risk perception on the psychological impact of quarantine during a pandemic outbreak. Data gathered from this study could inform policy makers about the best strategies that will take into account the various stages of health risk and, in particular, to adjust messages to the population.

Behavioral science aims to understand how individuals are motivated to protect themselves and others and how public health managers can promote such self-protecting and prosocial behaviors through specific measures or targeted communication (32–34). Communication at a time of health crisis may induce people to protect themselves and others through fear. However, evidence of the use of fear as a means in communication is inconsistent and often underlines a boomerang effect (35, 36). Individuals might be more prone to respect the quarantine if the communication in time of crisis, such as during the COVID-19 period, stressed the risk of vulnerable people being infected by a virus (37, 38), evoking the individual's empathic tendencies. In fact, some survey research shows that if a restriction of civil liberties (like quarantine and isolation) is oriented to protecting the health of the community and preventing deaths, people tend to accept it (39, 40). Acceptance of the quarantine and isolation measures might decrease the negative impact of the restriction of personal freedom. Measures limiting individual liberty used to reduce the risk of contagion can affect negatively both the mental and physical health of those involved. For the benefit of the wider community, individual freedom is compromised and while isolating sick patients tends not to provoke much concern, collective lockdown or quarantine of healthy people who only might be infected is controversial and

tends to provoke ethical concern (41–43). Ethical debate on public health pandemic behavioral prevention and management is open and recent perspectives stresses the value of solidarity and a relational autonomy approach able to ensure a common sense of social justice between the individual self and the others (44).

Finset et al. (45) highlights some elements particularly important in directing communication during a health crisis, such as the one with COVID-19. One of these elements is about the acknowledgment of the psychological impact related to the uncertainty of the situation and fear of infection. In this sense, communicators should express their empathy, demonstrating concern and understanding regarding the impact of the pandemic on individuals' lives. The results of the present research place themselves within this debate with the potential to add several practical considerations. The most important behaviors are well-known – wash your hands regularly, cough in a tissue, keep distance, wear mask, stay isolated if COVID-19 positive – but the way in which the message is implemented is not fully defined. Therefore, results from the present research will make it clear how to adapt the communication of personal and social risk, whether and how to include the empathic concern in the messages in order to maximize preventive behaviors and to decrease the negative psychological impact of quarantine. We also expect that the objective and perceived risk will play a role in determining the relationship between empathic concerns and psychological distress. We expect that the more the situation is uncertain and perceived as a risk for individual health, the more people would be willing to accept message explaining the importance of behavioral measures for their own safety and for the safety of the most vulnerable ones. We can speculate that the experience of those most exposed to risk for their own health could be informative for those less vulnerable. Such shared communication, if adequately promoted through public health messages, could enhance understanding of lockdown measures and ultimately social cohesion. The more health measures and individual restrictions are deliberately adhered to by the population without recourse to communications causing alarm or to coercive measures, the more the negative psychological impact will decrease and the ethical balance between the benefits and risks of personal restrictions will be advanced (46).

The present research has some limitations. First, the retrospective study has disadvantages such as memory bias and difficulty in analyzing the temporal relationship among variables. For this reason, a second prospective study was decided. However, its effective realization is not under our direct control, but depends on the contingent conditions (i.e., second wave). Currently, the retrospective study ensures the possibility to evaluate the state of mind of the individuals under different levels of objective risk without overwhelming people who are already in a difficult situation (i.e., positive to COVID-19). The second main limitation concerns the design. The two studies are cross-sectional and this limits the possibility to derive indications about causality. Another limitation concerns the fact that the measures are self-reported, which may biased the generalization

of the results through under-reporting, under-estimating, or having misunderstood the questions.

## AUTHOR CONTRIBUTIONS

NG, SP, and SB developed the idea and wrote the protocol. IM, RT, RM, and LG contributed to the development of the research questions and checked the final version of the protocol. All authors read and approved the final version of the manuscript.

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# COVID-19 Pandemic: Demographic Predictors of Self-Isolation or Self-Quarantine and Impact of Isolation and Quarantine on Perceived Stress, Anxiety, and Depression

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**Introduction:** With the sudden onset and global dispersal of the SARS-CoV-2 virus, many nations including Canada attempted to reduce spread of the resultant COVID-19 syndrome with self-isolation and quarantine, while seeking a cure or vaccine for this disease. Understanding impacts of self-isolation and self-quarantine on stress, anxiety, and depression will help us to mitigate these issues through appropriate development of mental health services.

**Methods:** The sample was drawn from individuals who self-subscribed to Text4Hope, a service that delivers text messages based on a cognitive behavioral therapy framework. Text4Hope was developed to support Albertans during the COVID-19 pandemic. Subscribers were asked for demographic information and if they had to self-isolate or self-quarantine during the pandemic via a survey link. Mental health was assessed using the validated instruments: Perceived Stress Scale (PSS), Generalized Anxiety Disorder-7 item scale (GAD-7), and the Patient Health Questionnaire-9 (PHQ-9). Descriptive statistics and Chi-Square test results were derived using Statistical Package for Social Sciences (SPSS) version-26.

**Results:** 6,041 of 32,805 Text4Hope subscribers (18.4%) completed the survey. Of these respondents, 19.2% had self-isolated or self-quarantined in Alberta as of March 31, 2020 during the COVID-19 pandemic. *Post-hoc* analysis using adjusted residuals suggested that individuals aged 60 years of age or older, and retirees had a higher likelihood of self-isolation or self-quarantine, compared to respondents with other age or employment characteristics. One-week prevalence rates for self-reported measures of moderate to high stress, likely Generalized Anxiety Disorder (GAD),



and likely Major Depressive Disorder (MDD) were 84.9, 46.7, and 41.4%, respectively. Respondents who had to self-isolate or self-quarantine during the COVID-19 pandemic were significantly more likely to present with moderate to high stress, significant anxiety symptomatology, and significant depressive symptomatology.

**Conclusions:** Older age and employment status were significantly associated with the likelihood of self-isolation or self-quarantine. We found elevated self-reported levels of anxiety and depression associated with self-reported COVID-19 pandemic-related self-isolation and self-quarantine activity. These findings have mental health implications both during and after the pandemic and demonstrate the need for greater focus on psychological complications of self-isolation and self-quarantine, and development of optimal ways to manage these pandemic consequences.

**Keywords:** COVID-19, pandemic, stress, anxiety, depression, isolation, quarantine

## INTRODUCTION

Coronavirus disease (COVID-19) is primarily a respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1, 2). Its origin traces back to Wuhan, China where it was first reported in December 2019 (1, 2). Following initial reports, it rapidly spread globally and was declared a pandemic by the World Health Organization (WHO) on March 11, 2020 (1). Nations soon took steps to reduce its spread by limiting access to certain facilities; implementing workplace hazard controls; introducing curfews and physical distancing measures, which include self-isolation and self-quarantine; imposing travel restrictions; and closing schools, shopping malls, and public spaces. These restrictions have caused substantial concerns, including the disruption of sport, recreation, and religious events, which individuals turn to for psychological and spiritual nourishment and entertainment. Panic buying was also observed, leading to a shortage of essential products, including toilet rolls and hand sanitizers.

Similar to other nations, Canada took steps to limit COVID-19 spread (2). Screening requirements were implemented for travelers returning from China to major airports in Montreal, Toronto, and Vancouver (January 22, 2020), later expanding to 10 airports in 6 provinces in early February 2020 (2). By mid-March 2020, voluntary, 2-week self-isolation was recommended for all individuals returning from travel abroad, a condition that was later mandated under the Canadian Federal Quarantine Act (March 25, 2020) (2). Self-isolation was also mandated for individuals diagnosed with COVID-19 and those who presented with disease-suggestive symptoms. Physical distancing measures, including maintenance of 2 m personal distance from others, and avoiding congregation, were put in place.

Self-isolation and self-quarantine measures deployed in the COVID-19 pandemic are based on public health knowledge gleaned from previous epidemics (3). Self-isolation, which is the separation of people who have been diagnosed with a contagious disease from those who are not sick (4, 5), differs from quarantine. Quarantine involves the separation and limitation of movement of individuals who have potentially been exposed

to a contagious disease to see whether they become unwell, thereby reducing the risk of infection to others (3, 6). As well-intentioned and effective as these measures are, they produce unintended consequences. Previous research has shown that isolation and quarantine may increase suicidality (7). Escalate boredom, heighten fears of infecting family, particularly among those with young children, limit supplies of essential goods, affect family finances, induce frustration, anger, and litigation (4, 7), and in some circumstances, result in the stigmatization of affected individuals.

Canada closed its southern border with the United States to all non-essential freight, services, and workers on March 18, 2020 (2). Similar mitigation strategies cascaded through Canadian provinces in order to limit COVID-19 spread. Provincial orders closed public schools, higher learning institutions, and daycare (March 15, 2020), followed by the closure of non-essential businesses (8). On March 25, 2020, Albertans were legally required under public health order to self-isolate after travel and when exhibiting symptoms, and to follow social distancing measures by limiting social interactions in public spaces, and maintaining 2 m personal distance from others (8).

Widespread public health efforts to try and limit rapidity of spread, to avoid overwhelming the healthcare system, caused cascading economic concerns as companies shut down and workers were laid off. Such economic worries are compounded by restrictions in social activities, limiting individuals to interaction primarily within their family units, including remote working for non-essential workers. Taha et al. showed that threats, such as those related to pandemics, affect physical health and cause psychological distress, with outcomes varying according to both appraisal and coping factors (3). They stress that emphasis on containment in family units and households gives rise to its own pressures, escalating pre-existing tensions in certain households, and/or giving rise to boredom. They also emphasize that individuals at home also may have increased time to tune in to media broadcasts, which are filled invariably with gloomy predictions about COVID-19 related morbidity and mortality and a degree of accompanying misinformation, both about the virus and disease spread. These factors produce fertile ground

for mental illness, and anxiety may become exacerbated in ambiguous or uncertain situations (3).

Furthermore, ideas concerning treatment of COVID-19 remain ambiguous and varied, including considerable public debate evolving over use and types of face masks as a protective measure, with prevention based primarily on hand-washing and physical distancing. This creates palpable tension between fear for the present and uncertainty about the future. While the public health response is focused on the fight to reduce infection rates due to community transmission of COVID-19, the overriding clinical goal is to save lives. These twin approaches, coupled with uncertain outcomes, have exacted a toll on the mental health of patients, families, and healthcare workers, as well as the population at large. Pandemic measures adopted so far, while effective, may also have widespread mental health implications that have not yet been examined. Mental health status, in turn, is likely to have significant effects on how well the population is able to comply with self-isolation and self-quarantine requirements.

Text messaging has demonstrated efficacy in public health interventions (9). To help address the potential stressors and mental health difficulties which inevitably arise during emergencies, Alberta Health Services (AHS), in conjunction with six health foundations and the Department of Psychiatry at the University of Alberta, launched the Text4Hope program. Text4Hope is an evidence-based tool providing daily free, cognitive behavioral therapy-based text messages for 3 months to Albertans who subscribe. Launched in March 2020, Text4Hope evolved from the pre-existing program infrastructure supporting the Text4Mood program, initially launched in January 2016 (10), and deployed to support patients in the aftermath of the Fort McMurray wildfires in 2016. Text messages were written by mental health therapists and were further refined from patient feedback. They are intended to help individuals identify and adjust negative thoughts, feelings, and behaviors arising from the COVID-19 pandemic. Understanding the extent of self-isolation and self-quarantine on stress, anxiety, and depression can help decision makers plan and allocate mental health resources more effectively for this, and future pandemics. This study examined the demographic characteristics of Albertans who self-isolated or self-quarantined during the early stages of the COVID-19 pandemic, and assessed the influence of self-isolation or self-quarantine on stress levels, anxiety, and depression.

## METHODS

We conducted a cross-sectional survey with online data collection. The study was approved by the University of Alberta Human Research Ethics Review Board (Pro00086163); consent to participate was implied when participants completed and submitted online survey responses. Demographic and clinical data were collected from subscribers to the Text4Hope program which was launched March 23, 2020 by the Chief Medical Officer for the Government of Alberta as part of the official government COVID-19 announcements. Using posters, email,

and social media, individuals were invited to subscribe to the program by texting “COVID19HOPE” to a short-code number. Subscribers then received a survey link to assess respondent self-isolation or self-quarantine activity during the COVID-19 pandemic and gather demographic characteristics including age, gender, ethnicity, education, employment status, relationship status, and housing status. The survey assessed clinical correlates using validated tools: the Perceived Stress Scale (PSS, to measure stress with moderate to high stress indicated with scores 14 and higher) (11), the General Anxiety Disorder-7 item scale (GAD-7) (12), to measure anxiety with likely Generalized Anxiety Disorder (GAD) represented by scores of 10 and higher), and the Patient Health Questionnaire-9 scale (PHQ-9, to measure depression with likely Major Depressive Disorder (MDD) represented by scores 10 and higher) (13). An *a priori* sample size of 4,200 was required to estimate mental disorder prevalence rates in Alberta (2019 population: 4,371,316) with a confidence level of 99% and 2% margin of error. With an expected 20% response rate (10), we planned to extract data upon recruitment of at least 20,785 Text4Hope subscribers. Data were extracted 1-week post-program launch with a total of 32,805 active Text4Hope subscribers. We analyzed data with Statistical Package for Social Sciences (SPSS) version 26 (IBM 2019) to generate descriptive statistics and Chi-square tests. Two-tailed significance ( $p < 0.05$ ) was used to assess the relationship between self-isolation or self-quarantine activity and clinical outcomes. There was no imputation for missing data and the results are based solely on completed survey responses.

## RESULTS

Of the 32,805 individuals subscribed to Text4Hope at 1-week post-launch, 6,041 individuals (18.4%) completed the baseline online survey. Overall, 86.4% of respondents identified as female ( $n = 5,185$ ) and 19.2% of respondents ( $n = 1,126$ ) self-isolated or self-quarantined by March 31, 2020 as part of public health measures put in place to contain the spread of the coronavirus in Alberta during the COVID-19 pandemic. **Table 1** provides descriptive summaries of respondent demographics and clinical correlates.

One-week prevalence rates for moderate to high stress, likely GAD, and likely MDD in Alberta were 84.9% ( $n = 4,683$ ), 46.7% ( $n = 2,360$ ), and 41.4% ( $n = 2,129$ ), respectively.

**Table 2** suggests there were significant associations between need to self-isolate and self-quarantine with two demographic variables: age and employment status. Specifically, individuals >60 years of age and retirees had a higher likelihood of self-isolation or self-quarantine, compared to respondents with other age or employment characteristics.

**Table 3** shows that respondents who had had to self-isolate or self-quarantine during the COVID-19 pandemic were significantly more likely to present with moderate to high stress, significant anxiety symptomatology, and significant depressive symptomatology. Small effect sizes were observed for each association.

**TABLE 1** | Gender distribution of demographic and clinical characteristics of respondents.

Variables	Male <i>N</i> (%)	Female <i>N</i> (%)	Gender Diverse <i>N</i> (%)	Overall <i>N</i> (%)
<b>Age (Years)</b>				
≤25	74 (10.3)	550 (10.8)	15 (30.6)	639 (10.9)
26–40	247 (34.3)	1,905 (37.4)	21 (42.9)	2,173 (37.1)
41–60	308 (42.8)	2,213 (43.5)	11 (22.4)	2,532 (43.2)
>60	91 (12.6)	423 (8.3)	2 (4.1)	516 (8.8)
<b>Ethnicity</b>				
Caucasian	560 (75.8)	4,307 (83.5)	37 (61.7)	4,904 (82.3)
Indigenous	20 (2.7)	180 (3.5)	4 (6.7)	204 (3.4)
Asian	73 (9.9)	226 (4.4)	1 (1.7)	73 (5.0)
Other	86 (11.6)	448 (8.7)	18 (30.0)	86 (1.4)
<b>Education</b>				
Less than High School Diploma	43 (5.8)	166 (3.2)	8 (13.1)	217 (3.6)
High School Diploma	93 (12.6)	483 (9.3)	6 (9.8)	582 (9.6)
Post-Secondary Education	598 (81.0)	4,476 (86.5)	41 (67.2)	5,115 (85.6)
Other Education	4 (0.5)	49 (0.9)	6 (9.8)	59 (1.0)
<b>Employment status</b>				
Employed	509 (73.2)	3,188 (72.2)	24 (57.1)	3,721 (72.2)
Unemployed	89 (12.8)	618 (14.0)	9 (21.4)	716 (13.3)
Retired	59 (8.5)	336 (7.6)	1 (2.4)	396 (7.7)
Students	38 (5.5)	275 (6.2)	8 (19.0)	321 (6.2)
<b>Relationship status</b>				
Married/cohabiting/partnered	521 (70.7)	3,728 (72.1)	28 (45.9)	4,277 (71.6)
Separated/Divorced	37 (5.0)	400 (7.7)	1 (01.6)	438 (7.3)
Widowed	6 (0.8)	85 (1.6)	0 (00.0)	91 (1.5)
Single	167 (22.7)	916 (17.7)	21 (34.4)	1,104 (18.5)
Other	6 (0.8)	45 (0.9)	11 (18.0)	62 (01.0)
<b>Housing status</b>				
Own home	457 (63.6)	3,427 (67.3)	23 (37.7)	3,907 (66.6)
Living with family	74 (10.3)	460 (9.0)	13 (21.3)	547 (9.3)
Renting	184 (25.6)	1,115 (22.6)	20 (32.8)	1,354 (23.1)
Other				
<b>Self-isolated/self-quarantined</b>	118 (16.5)	996 (19.6)	12 (20.7)	1,126 (19.2)
<b>Respondents reported moderate/high stress</b>	521 (79.2)	4,115 (81.6)	47 (90.5)	4,683 (84.9)
<b>Respondents reported significant GAD symptoms</b>	243 (40.9)	2,087 (47.3)	30 (62.5)	2,360 (46.7)
<b>Respondents reported significant depressive symptoms</b>	228 (37.3)	1,874 (41.8)	27 (56.3)	2,129 (41.4)

## DISCUSSION

This is the first Canadian study to survey the impact of self-isolation or self-quarantine measures on self-reported stress, anxiety, and depression, during the COVID-19 pandemic. The study included a large sample size as well as validated self-report measures. The majority of respondents in this survey identified as Caucasian ( $n = 4,904$ , 82.3%), between the ages of 26–60 years ( $n = 4,705$ , 80.3%), with post-secondary school education ( $n = 5,115$ , 85.6%), married or cohabiting ( $n = 4,277$ , 71.6%), employed ( $n = 3,721$ , 72.2%), and living in their own home ( $n = 3,907$ , 66.6%). These figures suggest pre-existing socioeconomic stability within the sample, prior to onset of the COVID-19 pandemic, thereby potentially mitigating the effects of these variables on their experiences of mental health difficulties. The

underrepresentation of those aged 60 years and above in this study is similar to what is observed in other studies (14) and may limit our inferences for this cohort. Social isolation and quarantine are effective methods of achieving prevention of the spread of infectious diseases, yet also limit individual rights (15), and are associated with negative impacts on mental health. Some studies demonstrate negative psychological effects that outlast the pandemic (16, 17). A recent review by Brooks et al. (4) examining the psychological impact of quarantine suggested that the psychological impact of quarantine is substantial, wide-ranging, and long lasting.

Respondents who self-isolated or self-quarantined during this early COVID-19 pandemic stage were significantly more likely to present with moderate to high stress, likely GAD, and likely MDD, with small effect sizes for each association. The rates

**TABLE 2** | Chi-Squared-test of association between demographic characteristics and likelihood to self-isolate or self-quarantine.

Variables	Had to self-isolate or self-quarantine (N = 1,126)	Have not had to self-isolate or self-quarantine (N = 4,915)	Chi-Square	P-value
<b>Gender</b>				
Male	118 (16.5%)	595 (83.5%)	3.80	0.15
Female	996 (19.6%)	4,089 (80.4%)		
Gender diverse	2 (20.7%)	46 (79.3%)		
<b>Age (Years)</b>				
≤25	113 (20.9%)	496 (79.1%)	21.57	0.00
26–40	428 (20.0%)	1,710 (80.0%)		
41–60	424 (17.0%)	2,073 (83.0%)		
>60	126 (25.2%)	374 (74.8%)		
<b>Ethnicity</b>				
Caucasian	948 (19.7%)	3,871 (80.3%)	4.75	0.19
Indigenous	37 (18.7%)	161 (81.3%)		
Asian	52 (18.1%)	236 (81.9%)		
Other	85 (15.9%)	450 (81.4%)		
<b>Education</b>				
Less than High School Diploma	44 (21.0%)	116 (79.0%)	1.57	0.67
High School Diploma	101 (17.8%)	468 (82.2%)		
Post-Secondary Education	969 (19.3%)	4,053 (80.7%)		
Other Education	9 (16.1%)	47 (83.9%)		
<b>Employment status</b>				
Employed	645 (17.6%)	3,014 (82.4%)	18.44	0.00
Unemployed	151 (21.4%)	553 (78.6%)		
Retired	98 (25.7%)	283 (74.3%)		
Students	60 (18.9%)	257 (81.1%)		
<b>Relationship status</b>				
Married/cohabiting/partnered	801 (19.1%)	3,398 (80.9%)	0.71	0.95
Separated/Divorced	87 (20.1%)	346 (79.9%)		
Widowed	15 (16.7%)	75 (83.3%)		
Single	210 (19.5%)	866 (80.5%)		
Other	15 (16.7%)	75 (83.3%)		
<b>Housing status</b>				
Own home	721 (18.6%)	3161 (81.4%)	9.64	0.07
Living with family	95 (17.6%)	445 (82.4%)		
Renting	286 (21.6%)	1,058 (78.8%)		
Other	15 (25.0%)	45 (75.0%)		

of anxiety (46.7%,  $n = 2,360$ ) and depression (41.4%,  $n = 2,129$ ) reported by respondents were substantially higher than both anxiety (6.3%) and depression (17.2%) rates reported by Wang et al. (18) in this context in China. Sensitization of the Canadian cohort by the free flow of information about the disease and its complications, as well as the inability to curtail disease transmission may have shaped the differences noted, in comparison to the Chinese sample.

Our study also showed that older adults and those who were retired were more likely to self-isolate or self-quarantine. This could reflect an increased likelihood of recent travel abroad (e.g., snow-birds or winter vacations) or may reflect greater awareness or knowledge of the risks to the elderly from reported COVID-19 fatalities, bearing in mind the greater

preponderance of medical comorbidities within this age group. This is a hypothesis that merits further exploration. Self-isolation, boredom, increased access to pessimistic information about the pandemic, occupational disruption and financial difficulties, and an increased number of deaths amongst older adults may collectively pose a higher burden on those in this age cohort, thereby increasing their risk of stress, anxiety, and depression (19).

There are many documented socio-demographic factors that predict which individuals are more likely to be vulnerable to disaster-related mental health impacts, including lower individual resilience, poor coping skills, disaster severity, degree of victim involvement, pre-existing mental health issues, gender, age, social support and relationships, government and insurance



**TABLE 3** | Chi-Square-test of association between self-isolation/self-quarantine and perceived stress, likely GAD, and likely MDD.

Variables	Perceived Stress (PSS scale)		Generalized anxiety disorder symptoms (GAD-7 scale)		Major depressive disorder symptoms (PHQ-9 scale)	
	Moderate/High Stress n (%)	P-value	Effect size (Phi)	GAD likely n (%)	P-value	Effect size (Phi)
<b>Self-isolated/quarantined</b>						
No	3,755 (84.3%)	0.03	0.030	1,849 (45.3%)	0.00	0.058
Yes	925 (87.0%)			511 (52.6%)	0.00	0.052
				1,665 (40.1%)		
				461 (46.5%)		

company support, and duration of the mental health issue (20, 21). Our present study did not examine the effects of employment type on the likelihood for individuals to self-isolation or self-quarantine, or on the mental health effects of the pandemic. However, Qiu et al. (19) found that migrant workers experienced higher distress levels in China during the COVID-19 pandemic. Previous studies also reported that age likely increases the risk of development of mental illness following natural disasters (22) and in particular, that individuals between the ages 18–30 years and those aged above 60 years were at increased risk of distress during the COVID-19 pandemic (19). Although individuals that self-identified as female may exhibit substantially increased anxiety risk (three-fold greater than self-identified males) in COVID-19 pandemic findings drawn from China (18, 19), no gender differences were noted in respect to self-isolation or self-quarantine in the present study.

The practical utility of this study is rooted in its potential to guide healthcare planners in making targeted evidenced-based decisions in deploying resources to assist individuals who self-isolate or self-quarantine during the COVID-19 pandemic. The deployment of simple technology like text messaging may be used to provide hopeful and encouraging information to individuals who are isolating or quarantining. The elderly are more likely to self-isolate or self-quarantine and therefore more likely to experience symptoms of stress and anxiety. They may also be less technologically savvy and therefore may not rely much on social media, instead depending on newspapers, radio, and television for entertainment and news. Public health measures should be directed at upskilling the elderly in the use of phones and the internet, as well, news articles on mass media should have a blend of the negative facts about the virus with more positive news about recoveries, and focus less on sensationalism which fuels uncertainty and panic. Guarantees about jobs and income during periods of self-isolation and self-quarantine may help to reduce anxieties about finances and loss of earnings and may deter individuals from disregarding policy guidelines suggesting that they self-isolate or self-quarantine.

Data collection for this study was completed by March 31, 2020, a week into the commencement of public health measures to limit the spread of COVID-19, and thus we are looking at early stage effects. This early stage data capture is a strength of our study as is the inclusion of an anxiety scale. Most studies have investigated post-traumatic stress disorder (PTSD) and depression in the aftermath of disasters and, in that context, generalized anxiety disorder is less frequently studied (20). Anxiety may fluctuate across time (19) during an epidemic, variation that has been attributed to trait anxiety, situation-appropriate coping strategies of avoidance, and personal hygiene practice (23). How the pattern and prevalence of anxiety evolves as the COVID-19 pandemic continues is an ongoing focus of our work.

Limitations of this study include a lack of baseline data on stress, anxiety, and depression levels before self-isolation and self-quarantine measures were implemented in Alberta: our study was initiated shortly after these measures were introduced. Another limitation of the study is that subscribers of the Text4Hope program could be residents who were seeking mental health

supports because they were more psychologically impacted by the pandemic than non-subscribers, there-by introducing a selection bias. For example, in a cross-sectional survey of subscribers to Text4Mood (the precursor to the Text4Hope program), about half of those surveyed indicated they signed up for the program to help elevate their mood (51.6 %,  $n = 461$ ) or to help them feel better (49 %,  $n = 440$ ), and a quarter indicated that they signed up for the program to help them worry less (24.5 %,  $n = 219$ ) (10). This suggests that individuals experiencing psychological distress are more likely to enroll on supportive text messaging programs.

Non-response bias may have also affected the results, given the low response rate in our study sample (22). It is possible that non-respondents may differ in a systematic way compared to respondents. For example, they may be more (or less) affected by the pandemic, or may have limitations in literacy or English fluency. Despite the low survey response rate, this study provides useful data about the mental health characteristics of individuals who self-isolate or self-quarantine in the early stages of a pandemic. Our findings present an important initial source of information for government and healthcare planners in determining the nature and quality of services required to address mental health challenges arising during this pandemic, as well as future pandemics that employ self-isolation or self-quarantine measures. Specifically, planning for and implementing virtual care programs including supportive text messages may be a fruitful approach to supporting isolated or quarantined individuals. Our research contributes to a larger program of research that is deliberately responding to the ongoing call for transformation of mental health care service to meet the needs of populations during the COVID-19 pandemic. Our study also aligns with our research program advocacy for mobilizing supportive text message technology (24–32) to reach populations disparately affected by mental health concerns.

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## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The study was reviewed and approved by University of Alberta Human Research Ethics Review Board (Pro00086163). The participants consent was implied if they accessed the online survey and returned completed responses.

## AUTHOR CONTRIBUTIONS

VIOA conceived and designed the study, including the Text4Hope program, supervised data collection, and performed data analysis. VIOA and NN jointly drafted the manuscript. KM, MH, AG, WV, and SS participated in study design. MH, AG, WV, and SS participated in data collection. AA-A, LU, BC, and AJG critically reviewed the manuscript and contributed to the final draft of the manuscript. All authors reviewed and approved the final draft of the manuscript.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Supporting Holistic Wellbeing for Performing Artists During the COVID-19 Pandemic and Recovery: Study Protocol

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The COVID-19 pandemic resulted in the abrupt closure of circus schools, venues, and companies, introducing a myriad of novel stressors. Performers and students must now attempt to maintain their technical, physical, artistic, creative, and cognitive abilities without in-person support from their coaches and must manage the isolation from their training and performing spaces. For circus artists, the transposition of the work space to a home environment is not possible, which creates novel stressors that could lead to the exacerbation and escalation of mental health issues. The purpose of this study is to develop, implement and evaluate a holistic interventional program based on the socio-ecological model of resilience and operationalized through physical literacy. This will be a prospective longitudinal study with a retrospective comparison to data from a similar student cohort pre-pandemic. Interventions were designed using a population-specific, participant-based developmental model within a knowledge translation framework. The interventional program includes group webinars, small group information sessions, and one-on-one Zoom meetings, in addition to the distribution of electronic educational materials. The interventions will holistically provide psychological, physical, social, technical, artistic, and creative supports. Resources will be deployed throughout the closure period and through recovery, as transitions to return to training after prolonged hiatus will magnify known psychological and physical difficulties. Repeated, longitudinal assessment of students will be utilized to track changes over time at key transitions in the pandemic and school year and will be compared to a pre-pandemic school year. The framework for this program will be translatable to other performing arts and high-performance contexts. The program has implications for the mental health and overall wellbeing of artists and for cultural and economic recovery of the industry.

**Keywords:** circus arts, human performance, psychological distress, resilience, physical literacy

## INTRODUCTION

In March 2020, performing arts training facilities, schools and professional companies in Canada were mandated to close in response to the COVID-19 outbreak. Thousands of performing artists were laid off and left uncertain about their future employment. Without proper instruction and facilities for the maintenance and development of their craft in artistic, psychological and physical



terms, they risk being under-prepared to re-join the workforce when their industry re-opens. Failure to make allowances for realistic return could result in artists and technical staff seeking alternative employment pathways. While other sectors of the entertainment industry, including professional sports, are working to return to modified seasons, the performing arts industry remains largely shut down, unlikely to reopen in a conventional manner in the near future.

Mental health issues are expected to increase in the general population with the experience of the pandemic (Torales et al., 2020). For instance, increased uncertainty about the future caused by the COVID-19 outbreak has been shown to result in cognitive dissonance, negative emotions, and lower life satisfaction leading to feelings of mental discomfort (Li et al., 2020). It is important to examine the biopsychosocial impacts of the pandemic (Castelnuovo et al., 2020), which could be amplified in performing artists who face additional challenges due to their unique work and training context. Performing artists strongly rely on their bodies to express their art which becomes intimately linked, or embodied, with cognition and emotion, and vice versa (Rokotnitz, 2018). Not only is cognition embodied in performing artists, it can also be considered as embedded and extended, especially in circus artists (Bessone, 2017; Malinin, 2019) who frequently play, interact, and connect deeply with the environment (e.g., props, apparatus, and audience). When performing, some even consider their apparatus as an extended part of their cognitive system (Sevdalis and Wöllner, 2016). As such, these physical artists could be uniquely vulnerable to psychological challenges associated with the COVID-19 outbreak through the forced separation of material, social, and mental spaces, in addition to general psychological distress related to the pandemic and unemployment.

Additionally, prior to the pandemic, when compared to age- and sex-matched peers, a similar percentage of circus students were classified as having severe psychological distress (9 versus 10–13.6% normative), yet a substantially higher percentage were classified in the moderate distress category (42 versus 24–31% normative; Decker, 2020). Given the high proportion of circus students in the moderate category, the added stressors of the pandemic have the potential to shift them into the severe category, thus increasing their risk of mental distress. Furthermore, it was shown that circus students were less well adapted in their mental, social, and physical health than professionals circus artists (Donohue et al., 2018). Therefore, interventions aimed at maintaining circus skills while also maintaining mental health are important for this population.

## Psychological and Holistic Health of Circus Artists

Little is known about how the psychological experiences of circus artists compared to other performance domains such as sport. Yet, findings of a qualitative investigation revealed that mental skills such as confidence, concentration, energy management, and emotional management are crucial to support artist development (Ross and Shapiro, 2017). Since circus arts exemplifies a truly embodied cognition context, a holistic

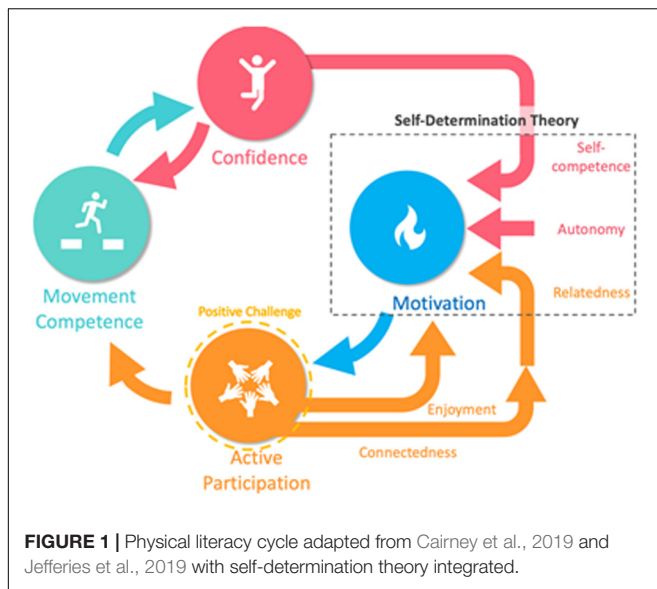
approach is required to simultaneously address cognitive, affective and performance demands (Rokotnitz, 2018). There is currently no research examining holistic health interventions in circus students and limited evidence in performance artists in general; however, leaders in the field argue that integrating interventions supporting coping, resilience, and creativity as part of the circus school curriculum is key to optimize artists' wellbeing (Ménard and Hallé, 2014; Filho et al., 2016; Burt and Lavers, 2017).

## Resilience

Because the pandemic situation presents multiple adversities for the performing arts community, a holistic health intervention using a resilience approach has the potential for positive impact in this population. Resilience is a multidimensional construct influenced by the intertwined relationship between the body and the mind (Jefferies et al., 2019). "In the context of exposure to significant adversity, resilience is both the capacity of individuals to navigate their way to the psychological, social, cultural, and physical resources that sustain their wellbeing, and their capacity individually and collectively to negotiate for these resources to be provided and experienced in culturally meaningful ways" (Ungar, 2008, p. 225). It involves nurturing internal resources such as self-efficacy and self-compassion (Ledesma, 2014; Masten, 2015). According to the socio-ecological model of resilience (Ungar et al., 2013), environments that provide resources to develop or maintain optimal psychological, social, and physical wellbeing facilitate the capacity of individuals to withstand, overcome, and adapt to adversity. Specifically, resilience-promoting interventions should consider the principles of *equifinality* (i.e., different interventions may produce conditions for individuals' potential to be optimized), *differential impact* (i.e., interventions exert a different impact across individuals, time, and context) and *contextual and cultural moderation* (i.e., protective interventions are culturally and contextually grounded) (Ungar et al., 2013). According to these principles: (1) an intervention with multiple modalities is important as resilience could be influenced by various pathways, including biological, social, and environmental (Cicchetti and Blender, 2006); (2) environmental factors, including family, and community should be taken into account as they will influence the impact of the intervention on individuals (Sanders et al., 2017); and (3) the intervention needs to be appropriate to the individuals' culture and context (Sanders et al., 2017). Importantly, addressing both internal and external resources ensures a community-based approach so the individual is not left to manage on their own (Jefferies, 2020). Interventions based on the socio-ecological model of resilience have shown positive impacts on both optimal growth and development in school and home settings (Twum-Antwi et al., 2020). This will be the first project using a resilience approach based on this model in a performing arts context. The resilience model needs to be operationalized in a manner that works in the circus context.

## Physical Literacy

Physical literacy offers a unique holistic approach and process (Jefferies et al., 2019) which includes crucial psychological



components that are essential for maintaining and restoring competencies and capacities (Cairney et al., 2019). It also provides a putative pathway to overall wellbeing in the performance arts contexts (Cairney et al., 2019). The physical literacy process has been identified where movement competence, confidence, motivation and social participation are linked in a positive feedback cycle (Cairney et al., 2019; Jefferies et al., 2019; **Figure 1**). Self-determination theory can be integrated to bolster the process for self-motivation in a social context (Deci and Ryan, 2012). Additionally, this core cycle does, at least partially, address the embodied nature of performance arts (Whitehead, 2013). Importantly, strong linkages between resilience and physical literacy have been demonstrated (Jefferies et al., 2019), and recent work has demonstrated that the construction of positive challenges in the training context of circus arts pupils may be the critical element for improving resilience (Jefferies et al., 2019; Jefferies, 2020). Furthermore, circus arts have shown simultaneous positive enhancement of physical, social and psychological attributes in youth (Kriellaars et al., 2019). Enhancing the understanding of physical literacy by all the actors [artists, coaches, health care professionals, artistic staff, safety staff (riggers), etc.] involved in the circus training context may be one key element of a holistic approach to foster protective environments for artists. Further, this common resilience and physical literacy framework would serve to form a collective approach to the development and care of artists, rather than the traditionally siloed models, and may facilitate a higher level of authentic exposure and trust between artist and all staff when under pandemic duress.

## The Current Study

The impact of the COVID-19 pandemic on the performing arts industry provides a unique opportunity to examine the effects of an intervention grounded in resilience and physical literacy on the holistic health of circus students. This study may provide a foundation for translating this intervention framework to other

performance and movement contexts where it can holistically address physical, psychological, social, and creative needs and emphasize resilience and overall wellbeing.

## METHODS AND ANALYSIS

### Design

A prospective longitudinal design with retrospective comparison to temporally matched data from a pre-pandemic school year, since previous research showed differences between circus students and the general population, as well as the existence of temporal variation in psychological characteristics within the school training year (Decker, 2020).

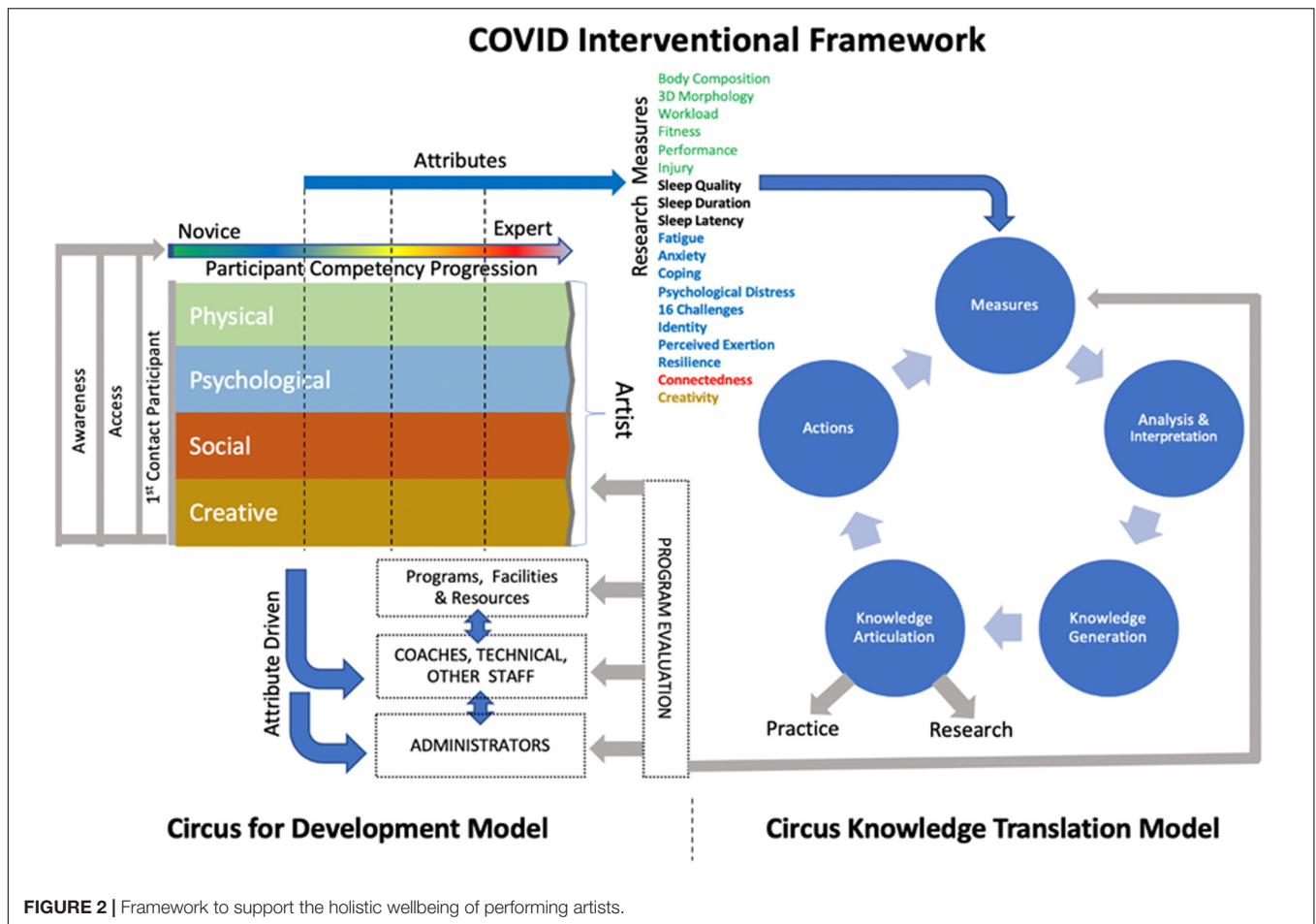
### Setting and Participants

The study will be conducted at an elite-level circus training school in Montreal, Canada. The school provides high school and three-year college level programs to prepare students for a professional career in circus arts. A more detailed description of the program of study can be found in Decker et al. (2019). Since the intervention will be implemented within the school curriculum, the entire cohort of college students will be included in the intervention and will be offered the opportunity to participate in the evaluation (nominally over 110 students for the college program, age range from 16 to 27, Male:Female ratio 1.5:1).

### Intervention

The intervention will be deployed for one full calendar year, aligning with the end of the upcoming school year (April 2020–April 2021). In accordance with the multisystemic model of resilience and physical literacy principles, our previously developed Circus for Development Model (CfD – see **Figure 2** left) will be used to guide the development of the intervention. Informed by empirical work and applied intervention done within the circus context (e.g., Ménard and Hallé, 2014; Burt and Lavers, 2017), CfD presents a continuum of competencies to be developed through and for circus artists' optimal growth from novice to expert. Namely, it integrates four key attributes that have been shown to contribute to artists' performance and wellbeing, including *physical attributes* (Decker et al., 2019; Kriellaars et al., 2019; Barker et al., 2020), *psychological attributes* (Shrier and Hallé, 2011; Filho et al., 2016; Ross and Shapiro, 2017; Donohue et al., 2018; van Rens and Filho, 2019), *interpersonal and social attributes* (Filho et al., 2017; Filho and Rettig, 2018), and *creative attributes* (Leroux and Batson, 2016). These four attributes will inform the learning domains of the intervention delivered to students to ensure that their holistic development and wellness are addressed.

The CfD is connected to our internal knowledge translation framework, the Actionable Dashboard framework, which adapts Graham et al. (2006) Knowledge to Action framework to the performing arts context (**Figure 2** – right). This combination creates a framework foundation for our COVID-19 intervention that necessarily includes stakeholders in continued communication with researchers to ensure the environment continues to support needs as the intervention is adapted to react



to the progression of the pandemic. The program will evolve with the pandemic, be culturally grounded in circus reality, and continuously adapted to specific student needs. It will also provide specific support to key stakeholders responsible for the students' development. Importantly, students will have access to resources including coaching (technical and artistic), safety (rigging and cleaning), healthcare (athletic therapists, medical doctor, social worker, and mental performance consultant), and educational staff, and will be supported to navigate to the resources in a timely manner.

The intervention will be delivered in phases aligning with the school year and pandemic restrictions. From April to June 2020, reactive online classes and programs were put in place to rapidly respond to the sudden temporary closure of the school and cessation of in-person training and courses. From July to August 2020 online support for students to maintain their wellbeing during the summer break will be provided. From September 2020 to April 2021 online support will be provided to students to supplement their in-facility training time, which will be significantly reduced to abide by jurisdictional limitations imposed due to the pandemic. In accordance with the contextual limitations, the program will use various delivery methods, such as (1) formalized regular communication to provide relevant information, (2) weekly interactive webinars on pre-determined

specific topics, (3) weekly "open office hours" offered by specific staff, (4) online delivery of physical preparation programs, (5) one-on-one meetings for individualized support as required, and (6) identification and communication of community-based resources.

The content and topics addressed by the various facets of the program will be designed around the CfD model and will be tailored to address the needs identified by the repeated assessments. Both internal and external resources will be addressed. It is expected that the topics will include:

- 1) Psychological
  - Emotional regulation, uncertainty management, motivation, resiliency, and dealing with catastrophic thoughts, and substance use.
- 2) Physical
  - Physical maintenance, sleep, body composition, nutrition, injury prevention, artistic, and technical training.
- 3) Social
  - Relationship management, meaningful connections while maintaining physical distance.

#### 4) Creativity

- Internet-based methods of creative expression, creativity fueling, character development, acting, and entrepreneurship.

### Procedures

In a previous series of studies, a battery of health and wellbeing assessments were administered to a similar cohort of circus students at strategic timepoints within the school year: September (commencement of semester one and upon return from summer break), December (conclusion of semester one and immediately prior to technical and academic exams), January (commencement of semester two and upon return from winter break), and April (conclusion of semester two and immediately prior to summative technical and academic exams). For the COVID interventional project, students will be assessed at key milestones during the COVID pandemic, as well as time points consistent with prior measurement to allow for temporally matched comparisons to the pre-COVID status (Table 1). With the ever-changing restrictions due to the pandemic, it is challenging to predict the exact milestones that may occur during the upcoming school year and the full impact it will have on students at all levels. It is likely that all students will have a modified training year with significantly fewer 1-on-1 training hours, and the assessment schedule allows both comparison with previous years, and to assess how well students are adjusting to the changed environment.

**TABLE 1 |** Rationale for post-COVID data collection points.

Time	Potential COVID-related challenges
May 2020 Post-COVID outbreak, during school closure	<ul style="list-style-type: none"> <li>• School closure</li> <li>• No access to training facilities</li> </ul>
July 2020 Post-COVID outbreak, end of school year	<ul style="list-style-type: none"> <li>• Completion of spring semester (optional for some)</li> <li>• First session of online training;</li> <li>• Potential for some minimal re-opening of facilities.</li> </ul>
Sept 2020 Beginning of fall semester	<ul style="list-style-type: none"> <li>• Potential for return to training</li> <li>• Extended deconditioning</li> <li>• Travel restrictions for international students.</li> </ul>
Dec 2020 End of fall semester	<ul style="list-style-type: none"> <li>• Potential plan to travel home with travel restrictions</li> <li>• Technical assessments following first 'COVID-modified' semester</li> <li>• Potential effects of second closure with second wave of outbreak</li> </ul>
Jan 2021 Return from winter break	<ul style="list-style-type: none"> <li>• Potential for travel issues with mandatory quarantine for international students</li> <li>• Possible deconditioning from 3-week winter break</li> </ul>
April 2021 Summative assessment for college students	<ul style="list-style-type: none"> <li>• Completion of a full school year with COVID-related modifications.</li> </ul>

### Measures

All measures will be distributed to participants via a single online questionnaire according to the schedule in Table 1. Measures were selected to align with the four domains of the CfD model (psychological, physical, social, and creative).

#### Circus Daily Challenges Questionnaire

Information regarding the daily challenges (hassles) of the students will be attained via the Circus Daily Challenges Questionnaire (CDCQ), adapted from the validated College Student-Athletes' Life Stress Scale (CSALSS; Lu et al., 2012). The questionnaire scores each of sixteen daily challenges relevant to a developing circus artist context based on the level (intensity) of the challenge and the self-perceived difficulty to manage the challenge. The level score ranges from 0 (none) to 3 (high) and the management score ranges from 0 (no difficulty) to 2 (high difficulty).

#### Perceived Coping

The students' evaluation of their physical and mental capacity to manage stress will be measured using a scale ranging from 1 (very poor ability) to 7 (very good ability) combined with an assessment of their perceived access to coping resources inside and outside of the school (0 = not really to 4 = very good). The four scores were summed to derive a total perceived coping score (0 – 18). The questions related to perceived coping were included as a section within the CDCQ.

#### State Anxiety

State anxiety will be assessed using a single-item (0 = no anxiety to 4 = high anxiety), based on the work of Davey et al. (2007).

#### Habits and Behaviors

A five-point scale (improved a lot, improved, not changed, slightly worse, and substantially worse) was used to assess self-reported changes in eating, technical training, physical preparation, artistic development, fitness, sleep, physical activity level, mental health, alcohol, and marijuana use in the current circumstance (measurement period) relative to the pre-COVID state.

#### Non-specific Psychological Distress

The six item Kessler Psychological Distress Scale (K6; Kessler et al., 2002) will be used to screen for moderate to severe non-specific psychological distress. K6 scores between 8 and 12 indicate moderate psychological distress, while scores equal to or greater than 13 indicate severe psychological distress.

#### Sleep and Fatigue

Sleep and fatigue metrics will be assessed using a modified version of the validated Consensus Sleep Diary (Carney et al., 2012). Sleep duration is derived from the recorded times for falling asleep and waking. Sleep quality, sleep latency, wakefulness (feeling refreshed upon waking), and fatigue will be assessed using ten-point numerical rating scales, whereby a score of one indicates a desirable score and 10 indicates an undesirable score. Students were also asked to record their daily napping behavior via a simple yes/no question each day.



## Creativity

Two creativity assessment tools were developed to assess artists “creative state and challenges related to the pandemic situation. According to the five A’s framework ‘creativity is concerned with the action of an actor or group of actors, in its constant interaction with multiple audiences and the affordances of the material world, leading to the generation of new and useful artifacts’ (Glăveanu, 2013, p. 76).” Building on the 5A model of creativity, both tools investigate *actors* (i.e., motivation, mindset, perception, and identity), *actions* (i.e., imagination, ideation, and exploration), *affordances* (i.e., constraints, available material, and use of the body), *audiences* (i.e., support and communication), and *artifacts* (creative outcomes). The first tool uses a five-point agreement scale from 1 (strongly disagree) to 5 (strongly agree) while the second tool, inspired by the Creative Activity Checklist (Runco and Jaeger, 2011), uses a frequency scale from 1 (never) to 5 (always).

## Data Collection and Analysis

All data will be collected electronically through the surveys and exported to Microsoft Excel, then imported to SPSS and Jamovi for statistical analysis. Between-group analysis will be used to examine differences between sexes and pre- and post-COVID (Mann-Whitney test), differences between disciplines (Kruskal Wallis), and differences between years in training program (Kruskal Wallis). Within-group analysis (Friedman test with Durbin-Conover pairwise comparison) will be used to assess variation in measures over time. Spearman correlation will be used to examine the relationships between key variables at specific times.

## Data Interpretation and Knowledge Articulation

All data will be analyzed upon receipt and presented to the school’s wellbeing committee. Following the actionable dashboard, differences between the pre- and post-COVID outbreak data will be interpreted carefully to allow for an accurate identification of consequences specifically caused by the pandemic. The assumption of consequences of such an unprecedented situation, without direct assessment of the students’ states, could misguide interventions and lower impacts. The proposed approach will, thus, generate contextualized knowledge to guide the school’s time and energy allocation to the most pressing matters to provide appropriate support as a means to optimize students’ wellbeing.

Based on the socio-ecological model of resilience, it is imperative to use data to identify resources that could be tailored to the individual (from assessments) and provide means to navigate to and negotiate for the resources that have been created (Marttila et al., 2012). One often neglected, yet important aspect for resource allocation in crisis settings is the issue of trust. Positive functioning in compromised settings requires the development of trust (Marttila et al., 2012); specific to the school’s context, trust between staff and students. The key findings will, thus, shape ongoing knowledge dissemination and presentations among these

two groups to instill a community that values transparent communication, which is essential to build a trusting rapport. Furthermore, knowledge will be articulated to promote clear understanding of the reasons behind each intervention to enhance engagement.

The school has established strong partnerships over time with other performing arts schools and professional organizations. These partnerships will create a knowledge conduit, providing a multi-directional process for sharing and tailoring knowledge to the context. As knowledge is created from this applied research project, a collaborative approach will be established with partners to adapt it to local contexts, to identify barriers, to tailor the interventions to align with their artists’ needs, and, where possible, share resources and platforms to augment the collective ability. Such an approach will result in an augmented learning experience for performing arts stakeholders, allowing for more evidence-based and culturally grounded intervention programs.

The dissemination of the results will enrich the body of literature that is emerging since the COVID outbreak by highlighting the specific impacts of this unprecedented situation on the performing arts community. The comparison with longitudinal baseline data collected from a previous student cohort is a strength of the current program. It will enable the analysis to go beyond a mere description of the students’ holistic states by pinpointing specific issues that are derived from the pandemic situation. Findings will also give valuable insight and provide guidelines to partners and the performing arts community at large for establishing meaningful programs to sustain and improve artists holistic wellbeing facing massive changes in the industry. The program has the potential to significantly improve the mental and physical wellbeing of students and provides a leading-edge approach to handling pandemic circumstances. The resources invested to support the artists through this crisis will facilitate a safe, efficient transition back to training and performing, enhance holistic wellbeing, and will also facilitate the recovery of the performing arts industry, which has important implications for the economy and culture.

## Ethics and Regulatory Approval

Baseline data collection was approved by the relevant academic research ethics boards. Ethics approval for the use of the new data generated by program evaluation will be sought.

## Limitations

Analysis of the survey data may necessitate revisions and/or additions to the intervention frameworks, as these models and their use in pandemic context are not validated, but have ecological validity. Additional psychological constructs may need to be considered to align with new iterations of the framework. Furthermore, the implementation of interventions will be secondary to providing training and academic instruction related to the professional degree. Finally, there may be very different circumstances due to travel restriction for international students.

## DISCUSSION

This applied research study will examine the effects of a holistic, resilience-promoting program based on the CfD model founded in physical literacy on the wellbeing of circus students over the course of a school year affected by COVID-19 restrictions compared to a typical school year. The goal of the intervention is to help the community thrive through the remainder of and following the pandemic. This study will provide valuable information about the mechanisms used by students to respond and rebound from adversity and will increase collective knowledge about successful interventions to enhance students' wellbeing in a physically restricted context. Hence, the results of the current investigation could guide future intervention on how equifinality, differential impact, and contextual and cultural moderation can be addressed within a circus community to shape an environment promoting holistic wellbeing. Furthermore, combining this socioecological approach to resilience with the CfD framework to design interventions supporting artists in a time of intense adversity raises promising research and applied opportunities. Findings will provide empirical ground for the CfD framework while better defining interventions that are effective to sustain physical, psychological, social and creative competencies through adversity as exemplified next. Importantly, while the CfD model was developed specifically

in circus arts, its foundation in physical literacy makes it applicable to many contexts where people engage in learning and development through movement. Our comprehensive model could have implications for human development and performance optimization in all performing arts, sport and athletics, military, rehabilitation, and health and wellbeing in the general population.

## ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

MS and VR drafted the manuscript and which was critically reviewed with significant input from all authors. All authors contributed significantly to the design of the project, analysis plan, and authorize the submission of this manuscript and accept responsibility for the publication.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Epidemic Risk Perception, Perceived Stress, and Mental Health During COVID-19 Pandemic: A Moderated Mediating Model

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The aim of the present study was to investigate relationships among epidemic risk perception, perceived stress, mental health (depression and anxiety), future time perspective, and confidence in society during the novel coronavirus disease (COVID-19) pandemic in China. Especially, we wonder that whether perceived stress mediates associations between epidemic risk perception and mental health and that whether future time perspective and confidence in society moderate the link between perceived stress and mental health. This cross-sectional study was conducted among 693 Chinese adults aged 18–60 years. The results showed that epidemic risk perception was positively related to perceived stress, depression, and anxiety. The correlations between epidemic risk perception and depression and anxiety were reduced when perceived stress was included, suggesting that perceived stress mediated these relationships. Moreover, the boundary conditions for the associations among perceived stress, depression, and anxiety were found in the study. Specifically, positive future time perspective could buffer the negative effects of perceived stress on depression, and confidence in society could weaken the negative effects of perceived stress on anxiety. Based on these findings, practical guidance and theoretical implications are provided for the public to maintain mental health during COVID-19 pandemic. Limitations and future directions are also discussed.

**Keywords:** future time perspective, confidence in society, coronavirus disease, epidemic risk perception, perceived stress, anxiety, depression

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## INTRODUCTION

The novel coronavirus disease (COVID-19) pandemic has spread across the globe. Owing to its rapid and extensive transmission, high infectivity, and lack of specific treatment so far, it has posed great threat to people's mental and physical health. Unexpected public crisis events can easily cause the public to develop psychological reactions such as tension, anxiety, and even panic, which may lead to psychological disorders such as stress disorder and depression (Zhao et al., 2009). Therefore, it is of great practical significance and theoretical implications to study the impact of unexpected public crisis events on public mental health, and how to help individuals cope better with the crisis to maintain mental health.



Perceiving and avoiding risks are natural instincts of living beings. Risk perception is the core variable that induces psychological and behavioral responses among people in public crisis events, and exerts significant influences on both daily life decisions and behaviors (Slovic, 2000; Erdem and Swait, 2004; Li et al., 2009). Risk perception refers to an individual's subjective judgment of risk based on objective crisis events, including the uncertainty about threats and severity of consequences (Cho and Lee, 2006). Perceived risk puts people in a distressed and anxious state, which in turn motivates them to engage in problem-solving activities to resolve it (Cho and Lee, 2006). People are likely to employ information search as a problem-solving strategy to reduce perceived risk, and they may also pay attention to existing problems and take precautions in advance to avoid more serious consequences (Shi et al., 2003; Li et al., 2009). However, if an individual stays in a highly threatening environment over a long period of time, certain physical and psychological problems tend to arise (Peters and McEwen, 2015; Nie et al., 2018). A study has revealed that people with a higher risk perception of the severe acute respiratory syndrome (SARS) epidemic are more likely to panic and respond unfavorably (Shi et al., 2003). A previous study on the Wenchuan Earthquake has shown that having a risk perception for unexpected natural disasters is negatively associated with public mental health (Li et al., 2009). Taking these together, we posit Hypothesis 1: Epidemic risk perception is positively related to depression (H1a) and anxiety (H1b).

The core of risk perception is the threat posed by uncertainties about the environment (Cho and Lee, 2006). In the context of an epidemic, people face huge uncertainties with respect to the life, work, economic prospects, and international relations. In such situations, the immediate feeling of the public is psychological stress. Perceived stress is the psychological response to threatening stimuli in the environment after cognitive evaluation and can be manifested as physical and mental tension, as well as loss of control (Cohen et al., 1983). The stress mainly stems from the sense of threat and expectation of adverse results in the future (Peters and McEwen, 2015; Peters et al., 2017). Individuals predict future results through comprehensive judgments of risk information in the present environment. If this prediction is filled with uncertainties, or if the expected results pose serious harm, stress will ensue, and even blood pressure may rise (Greco, 2003). Therefore, the higher the level of risk perception, the greater the psychological stress people will develop (Webster et al., 1988). This leads to the question that if risk perception causes stress, how does stress exert its impact on mental and physical health? Stress is one of the leading causes of mental and physical health problems (Gayman et al., 2011; Peters and McEwen, 2015). Research has shown that the body is likely to produce negative responses to cope with stress in a threatening environment (Gayman et al., 2011; Peters and McEwen, 2015), and increased stress is associated with many physical diseases (McEwen, 1998; Peters and McEwen, 2015) and mental health disorders, such as anxiety and depression (Olson and Surrence, 2004; Bardeen et al., 2013; Liu et al., 2015). Although researchers have investigated the relationship among risk perception, perceived stress, and mental health, few studies have been explored how risk perception affects mental health

through the mediation of perceived stress. The risk perception of COVID-19 outbreak may lead to an increase in people's perceived stress. On the one hand, people's perception of uncertainty about the threat of being infected has caused them to maintain a stressful state. On the other hand, since the outbreak, a series of prevention and control measures such as lockdown of cities, road closures, work stoppages, and production shutdowns have exerted a huge impact on the daily life of the public. With the increased duration of preventive measures and lockdown, the circumstances of businesses being unable to resume work, sharp declines in individual incomes, fear of being infected, and inability to repay car loans and mortgages, etc., have imposed great psychological stress on people. In such a stressful environment, people become prone to allostatic overload, which could lead to negative psychological symptoms (Pedrelli et al., 2008). To sum up, we propose H2: Perceived stress mediates the link between epidemic risk perception and both depression (H2a) and anxiety (H2b).

The psychological resilience theory (Luthar et al., 2015) holds that individuals can successfully cope with stress and maintain mental health even in the face of adversity, because internal and external protective factors can alleviate the negative effects of stress on individuals. A research on which factors can help people cope with stress and respond with active adaptation for them to maintain mental health in times of crises carries great significance. Studies have pointed out that beliefs play an important role in human behaviors and mental health (Bandura, 1997; Luszczynska et al., 2009). People's beliefs in the face of uncertainties moderate the intensity of stress responses (de Berker et al., 2016). The better one adjusts one's beliefs in the face of uncertainties, the better the future results can be predicted, which in turn eases the stress response. With respect to protective factors within individuals, their beliefs and confidence in society constitute mental resources with which they respond effectively to environmental threats and uncertainties, and a high level of trust can reduce uncertainties and buffer the negative impact of environmental stress (Keller et al., 2011).

As a kind of important belief in the future, future time perspective (FTP) refers to an individual's thought, feeling, and action tendencies toward the future (Lyu, 2014; Lyu and Huang, 2016). Individuals with a high level of FTP have three main characteristics: focusing on the future, being optimistic and cherishing hope, and valuing goals (Chin and Holden, 2013). Active attention to the future helps improve individuals' life satisfaction (Pallini et al., 2016). When anticipating the future, an individual either looks forward to the future with optimism and bears confidence and hope for realizing future goals, or considers the future to be threatening (Ringle and Savickas, 1983). People with positive future orientation maintains an optimistic and hopeful attitude toward expectations of future results (Chin and Holden, 2013; Pallini et al., 2016), which can buffer the impact of environmental stress on negative emotions (Denovan and Macaskill, 2013) and reduce the tendency of depression (Hirsch et al., 2011). Individuals who value their future goals are able to predict the future values of their current behaviors, which stimulates their current adaptive behaviors (Chin and Holden, 2013). In the face of stressful situations, individuals with positive

future orientation have strong adaptability, such as finding a job or shelter more quickly when they are homeless (Epel et al., 1999). Research on people's mental health after the September 11 attacks have found that FTP is associated with higher levels of positive emotions (Holman, 2015; Holman et al., 2016) and reduced psychological stress 2 years post-9/11. In short, individuals with a positive attitude toward the future are able to maintain optimism and hope for the future, as well as focus on constructive behaviors that add to their future benefits. On the contrary, individuals with a negative attitude toward the future feel confused and pessimistic, which may easily lead to worry and anxiety about the future (Shipp et al., 2009). In summary, in this study, FTP is regarded as an important psychological resource that can buffer the adverse effects of perceived stress on mental health. Thus, H3 is proposed: Positive future time perspective negatively moderates the effect of perceived stress on both depression (H3a) and anxiety (H3b), while negative future time perspective positively moderates the effect of perceived stress on both depression (H3c) and anxiety (H3d).

Confidence in society refers to the positive expectation that society, based on its past performance, has its future under control (Keller et al., 2011). From a sociological perspective, confidence in society is a core component of social capital (Cook, 2005). If the members of a society have confidence in the ability of the social system to deal with future problems and risks, then social capital will increase. High levels of confidence in society make individuals feel calm and safe and show more cooperative behavior when responding to threats (Earle et al., 2007), so as to ensure the continuous operation of society (La Porta et al., 1997). From a psychological perspective, confidence in society is assumed to act as a psychological buffer against the influence of environmental stress and uncertainties evoked by societal transformation (Keller et al., 2011). Research has shown that confidence in society is negatively correlated with trait anxiety and neuroticism, and positively correlated with self-esteem, self-efficacy, and life satisfaction (Keller et al., 2011). Individuals lacking confidence in society do not believe that society can cope with crises and maintain control and stability, and they are likely to experience greater tension and anxiety. Thus, this study considers confidence in society as a psychological buffer against the effect of perceived stress and mental health. In a situation of lack of sufficient information to reduce fear of the unknown, high levels of confidence in society can effectively reduce anxiety and depression, thus buffering the negative effects of perceived stress on mental health. Although dealing with uncertainties brought by changes in the environment is essential to individuals' life and mental health, little research has been conducted in this area so far. Therefore, we posit that H4: Confidence in society negatively moderates the effect of perceived stress on both depression (H4a) and anxiety (H4b).

In summary, the aim of the research is to investigate the mediating effect of perceived stress on the relationship between epidemic risk perception and mental health (anxiety and depression), and examine the moderating effect of FTP and confidence in society on the relationship between perceived stress and mental health. The validation of the protective effect

of FTP and confidence in society may help to support the public in maintaining their mental health and carrying out psychological prevention and intervention during an epidemic from the perspective of positive psychology.

## MATERIALS AND METHODS

### Participants and Procedure

During the outbreak of novel coronavirus disease (COVID-19) in China, we recruited participants via wjx.cn, a reliable Chinese online platform for data collection and randomly distributed questionnaire links in the participant pool. The data collection began on February 6, 2020. A week later, 701 participants answered the questionnaires. All participants consented to attend the study after being informed about the purpose of the study. After excluding cases with invalid responses (e.g., too-short answering time or same answers for each item), we retained a final sample of 693 participants. Participants were given a packet of questionnaires that included questions regarding demographics, epidemic risk perception, perceived stress, anxiety, depression, future time perspective, and confidence in society. No direct compensation was provided for study participation.

The samples of the present study were mainly from Henan Province (32.6%), Shandong Province (28.6%), and Chongqing city (29.9%), accounting for 91% of the total samples. Only 17 participants were from Wuhan, Hubei Province, and the remaining 45 participants were scattered in other Chinese cities. The sample consisted of 619 general public, 17 quarantined personnel, 29 frontline medical workers, and 12 community service workers. Among all participants, 62.0% were females and 38.0% were males. Moreover, 29.9% were between 18 and 25 years old, 18% were between 26 and 30 years old, 22.7% were between 31 and 40 years old, 21.2% were between 41 and 50 years old, and 8.2% were between 51 and 60 years old. Also, 82.4% of participants received at least a college degree.

### Measures

#### Epidemic Risk Perception

One single item was used to measure epidemic risk perception. Participants were asked to evaluate the perceived risk of infection during the outbreak of COVID-19. Ratings were given on a 10-point Likert scale (1 = not at all threatening, 10 = extremely threatening). In this study, the average score of epidemic risk perception of all participants was 6.03 ( $SD = 2.26$ ).

#### Perceived Stress

The perceived stress scale-10 (PSS-10; Cohen et al., 1983) was used to measure the extent to which respondents feel that their stress is unpredictable, uncontrollable, and overwhelming. It comprises 10 items that allow five responses in a Likert scale: never (0), almost never (1), sometimes (2), often (3), and very often (4). Total scores range from 0 to 40, with higher scores indicating greater perceived stress. Cronbach's alpha with the current sample was 0.85.

## Mental Health

Anxiety and depression were used as indicators of mental health.

**Anxiety:** The generalized anxiety disorder-7 scale (GAD-7) was used to measure participants' worry and general somatic tension (Spitzer et al., 2006). It has seven items rated on a four-point Likert scale indicating symptom frequency, ranging from 0 (not at all) to 3 (nearly every day). Higher scores indicate higher levels of anxiety symptoms. In this study, Cronbach's alpha of the scale was 0.92.

**Depression:** The center for the epidemiological studies of depression-10 (CES-D-10; Andresen et al., 1994) was used to measure depression. This scale consists of 10 items to assess symptoms of depression (e.g., "I felt depressed"), and response anchors range from 0 (rarely) (less than 1 day) to 3 (most or all of the time) (5–7 days). Participants indicate how true each statement is to them over the past week. Cronbach's alpha for the present sample was 0.84.

## Future Time Perspective

Future time perspective was assessed by the future subscale of Time Attitude Scale (TAS, Worrell et al., 2013). The scale consists of 30 items on six subscales: past positive, past negative, present positive, present negative, future positive, and future negative, which has demonstrated adequate reliability, validity, and generally strong psychometric properties in adolescent and adult samples (Mello et al., 2016). In the present study, we mainly adopted the future dimension of TAS, with 10 items and 2 subscales (future positive and future negative). Participants were asked to answer the questions on a five-point scale from 1 (strongly disagree) to 5 (strongly agree). In the present sample, Cronbach's alphas of future positive and future negative were 0.85 and 0.73, respectively.

## Confidence in Society

Confidence in society was assessed by the general confidence scale developed by Keller et al. (2011). The scale has six items rated on a seven-point Likert scale (1 = totally disagree, 7 = totally agree). Higher scores indicate higher levels of confidence in society. In this study, Cronbach's alpha score of the scale was 0.89.

## Control Variables

We controlled for participants' gender (0 = female, 1 = male), age (1 = 18–25 years; 2 = 26–30 years; 3 = 31–40 years; 4 = 41–50 years; 5 = above 51 years), and education level (1 = vocational school, technical secondary school; 2 = high school; 3 = vocational/junior college; 4 = undergraduate; 5 = graduate) because these demographic variables have been reported to link to individuals' mental health (e.g., Cauce et al., 2000; Halpern-Manners et al., 2016).

## Data Analysis

Statistical analysis was performed using SPSS 22.0 and AMOS 21.0 software packages. The normal distribution of all variables was tested using the Kolmogorov–Smirnov test, and all continuous variables follow the normal distribution. The statistical methods included descriptive statistics, correlation analysis, regression analysis, structural equation model, and

bootstrap analysis, etc. The significance level of all variables was set as  $\alpha = 0.05$ .

## RESULTS

### Descriptive Statistics and Correlation Analyses

Descriptive statistics, including means, SDs, correlations, and reliabilities, are presented in **Table 1**. Epidemic risk perception, perceived stress, anxiety, and depression were found to be positively related to one another. Moreover, future negative was positively associated with anxiety and depression. Future positive and confidence in society were negatively linked with anxiety and depression.

### Associations Between Epidemic Risk Perception and Mental Health

In the current study, regression analysis was used to explore the association between epidemic risk perception and mental health. Hypotheses 1a and 1b posit that epidemic risk perception is positively related to depression (H1a) and anxiety (H1b). As shown in **Table 2**, after the effects of gender, age, and education level had been controlled, epidemic risk perception positively related to depression ( $\beta = 0.19$ ,  $SE = 0.04$ ,  $p < 0.01$ ) and anxiety ( $\beta = 0.28$ ,  $SE = 0.04$ ,  $p < 0.01$ ). Thus, Hypothesis 1a and 1b were supported.

### Examination of Moderated Mediation Model

More also, path analysis was conducted in Amos21.0 to test the mediating effect of perceived stress between epidemic risk perception and mental health, and the moderating effect of FTP and confidence in society on the relationship between perceived stress and mental health. Given that anxiety and depression were used as indicators of mental health, we developed two models with anxiety (Model 1) and depression (Model 2) as outcome variables, respectively. Both model 1 and model 2 had a reasonably good fit to the data [Model 1:  $\chi^2/df = 2.30$ , comparative fit index (CFI) = 0.98, Tucker–Lewis index (TLI) = 0.96, root mean square residual (RMR) = 0.04, root mean square error of approximation (RMSEA) = 0.04; Model 2:  $\chi^2/df = 2.29$ , CFI = 0.98, TLI = 0.96, RMR = 0.04, RMSEA = 0.04]. **Table 3** shows the results of path analysis of the hypothesized model.

Hypotheses 2a and 2b predict that the positive relationships between epidemic risk perception and depression/anxiety are mediated by perceived stress. As shown in **Table 3**, epidemic risk perception was found to be positively related to perceived stress ( $\beta_{Model\ 1} = 0.16$ ,  $SE = 0.03$ ,  $p < 0.001$ ;  $\beta_{Model\ 2} = 0.16$ ,  $SE = 0.03$ ,  $p < 0.001$ ), and perceived stress was positively related to depression ( $\beta = 0.62$ ,  $SE = 0.03$ ,  $p < 0.001$ , Model 1) and anxiety ( $\beta = 0.67$ ,  $SE = 0.04$ ,  $p < 0.001$ , Model 2). When perceived stress was included, epidemic risk perception positively related to anxiety ( $\beta = 0.15$ ,  $SE = 0.03$ ,  $p < 0.001$ , Model 2) but not related to depression ( $\beta = 0.04$ ,  $SE = 0.03$ ,  $p < 0.05$ ,

**TABLE 1 |** Means, SDs, and correlations.

Variables	1	2	3	4	5	6	7	8	9	10
1. Epidemic risk perception	–									
2. Perceived stress	0.19**	<i>0.85</i>								
3. Future positive	–0.07	–0.54**	<i>0.85</i>							
4. Future negative	0.10*	0.48**	–0.58**	<i>0.74</i>						
5. Confidence in society	–0.07	–0.41**	0.53**	–0.34**	<i>0.89</i>					
6. Anxiety	0.29**	0.63**	–0.30**	0.30**	–0.26**	<i>0.92</i>				
7. Depression	0.17**	0.73**	–0.53**	0.48**	–0.40**	0.71**	<i>0.84</i>			
8. Gender	0.06	0.08*	–0.01	0.04	0.03	0.06	0.03	–		
9. Age	0.11**	–0.23**	0.12**	–0.01	0.15**	–0.02	–0.16**	–0.25**	–	
10. Education level	–0.04	–0.04	0.03	–0.10**	–0.01	–0.08*	–0.06	0.03	–0.05	–
<i>M</i>	6.03	2.68	3.69	2.33	5.32	1.29	1.82	0.38	3.59	4.04
<i>SD</i>	2.26	0.68	0.78	0.83	1.19	0.42	0.48	0.49	1.36	0.9

*N* = 693.

Cronbach's alphas are presented on the diagonal in italics.

Gender: 0, female; 1, male. Education: 1, vocational school, technical secondary school; 2, high school; 3, vocational/junior college; 4, undergraduate; 5, graduate. Age: 1, 18–25 years; 2, 26–30 years; 3, 31–40 years; 4, 41–50 years; 5, above 51 years.

\**p* < 0.05, \*\**p* < 0.01.

**TABLE 2 |** Results of regression analysis.

	Depression	Anxiety
<b>Control variables</b>		
Gender	–0.03 (0.04)	0.031 (0.04)
Age	–0.18 (0.04)**	–0.050 (0.04)
Education level	–0.06 (0.04)	–0.074 (0.04)*
<b>Predictor</b>		
Epidemic risk perception	0.19 (0.04)**	0.28(0.04)**
<i>F</i>	11.95**	17.49**
Adjusted <i>R</i> <sup>2</sup>	0.07	0.09

*N* = 693.

Statistics reported are standardized regression coefficients (and SEs).

\**p* < 0.05, \*\**p* < 0.01.

Model 1). These results suggest that perceived stress partially mediates the link between epidemic risk perception and anxiety, and fully mediates the link between epidemic risk perception and depression. We further tested the two mediating effects using 5,000 bootstrapping samples. The analyses indicated a significant mediating effect between epidemic risk perception and depression through perceived stress [indirect effect = 0.10, *SE* = 0.02, 95% CI (0.06, 0.14), excluding zero]. The results also indicated a significant mediating effect between epidemic risk perception and anxiety through perceived stress [indirect effect = 0.10, *SE* = 0.02, 95% CI (0.07, 0.15), excluding zero]. Thus, Hypotheses 2a and 2b were supported.

Hypotheses 3a, 3b, 3c, and 3d propose the moderating effect of future positive/future negative on the relationship between perceived stress and depression/anxiety such that the relationships become weaker when future positive is high rather than low and when future negative is low rather than high. We centered all continuous variables before creating their product terms. The results from path analysis show that only the interaction term of future positive and perceived stress is negatively related to depression ( $\beta = 0.15$ , *SE* = 0.03, *p* < 0.001;

**TABLE 3 |** Path analysis results on depression and anxiety.

	Model 1		Model 2	
	Perceived stress	Depression	Perceived stress	Anxiety
	$\beta$ (SE)	$\beta$ (SE)	$\beta$ (SE)	$\beta$ (SE)
<b>Control variables</b>				
Gender	0.02 (0.03)	–0.04 (0.02)	0.02 (0.03)	0.03 (0.03)
Age	–0.18** (0.03)	–0.02 (0.03)	–0.18** (0.03)	0.10** (0.03)
Education level	–0.01 (0.03)	–0.02 (0.02)	–0.01 (0.03)	–0.05 (0.03)
<b>Predictors</b>				
Epidemic risk perception	0.16** (0.03)	0.04 (0.03)	0.16** (0.03)	0.15** (0.03)
Perceived stress		0.62** (0.03)		0.67** (0.04)
Future positive		–0.09* (0.03)		–0.07 (0.04)
Future negative		0.10** (0.03)		0.03 (0.04)
Confidence in society		–0.07* (0.03)		–0.02 (0.03)
Future positive × perceived stress		–0.15** (0.03)		–0.06 (0.04)
Future negative × perceived stress		–0.02 (0.03)		–0.04 (0.04)
Confidence in society × perceived stress		–0.01 (0.03)		–0.11** (0.03)

*N* = 693.

Statistics reported are standardized regression coefficients (and SEs).

\**p* < 0.05, \*\**p* < 0.01.

Model 1). To further interpret the results, we conducted a simple slopes analysis. The interaction plot in **Figure 1** shows that with low future positive (1 SD below the mean), perceived stress is negatively related to depression (*simple slope* = 0.79, *SE* = 0.04, *p* < 0.001) and stronger, while with high future positive (1 SD above the mean), perceived stress is significantly related to



depression (*simple slope* = 0.55, *SE* = 0.03,  $p < 0.001$ ) and weaker. Thus, Hypothesis 3a was supported, but hypotheses 3b, 3c, and 3d were not supported.

Hypotheses 4a and 4b predict that the positive relationships between perceived stress and depression/anxiety are negatively moderated by confidence in society such that the relationships become weaker when confidence in society is high rather than low. The results from path analysis indicated that only the interaction term of confidence in society and perceived stress was negatively related to anxiety ( $\beta = 0.11$ , *SE* = 0.03,  $p < 0.05$ ; Model 2). The interaction plot in **Figure 2** indicates that with low confidence in society (1 SD below the mean), perceived stress was negatively related to anxiety (*simple slope* = 0.79, *SE* = 0.05,  $p < 0.001$ ) and stronger, while with high confidence in society (1 SD above the mean), perceived stress was significantly related to anxiety (*simple slope* = 0.51, *SE* = 0.04,  $p < 0.001$ ) and weaker. Thus, hypothesis 4a was not supported and hypothesis 4b was supported.

## DISCUSSION

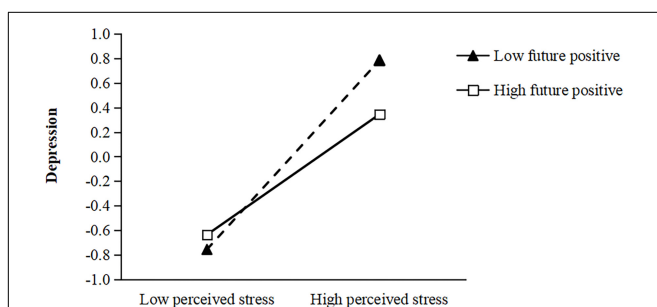
This study investigated the mediating effect of perceived stress on the relationship between epidemic risk perception and mental health (anxiety and depression), and the moderating effects of FTP and confidence. The results revealed that epidemic risk perception has a significant positive effect on anxiety and depression, which is consistent with previous research results

on public crisis events and mental health (Shi et al., 2003; Li et al., 2009; Nie et al., 2018). The occurrence of public crisis events sharply increases individuals' perceived risks, and such an environment, filled with threats and uncertainties, can easily cause anxiety and depression (Zhao et al., 2009; Peters and McEwen, 2015). The risks during an epidemic also lead to a loss of the sense of control and a feeling of powerlessness, wherein the public can only passively await the development of the epidemic, and people may thus experience higher level of depression and anxiety.

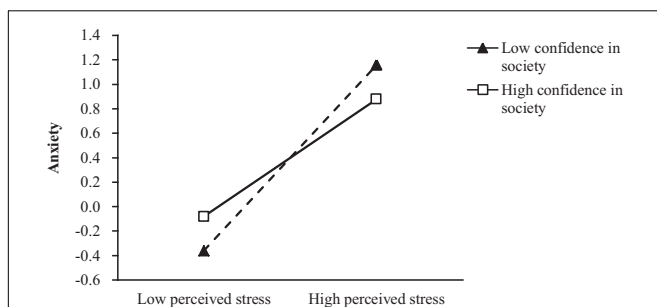
More importantly, this study found that perceived stress exerts a partial mediating effect on the relationship between epidemic risk perception and anxiety, and a full mediating effect on the relationship between epidemic risk perception and depression. This difference may be caused by the different cognitive features of anxiety and depression. Given that the cognitive bias of depression is a combination of emotions and negative memories, people with excessive psychological stress tend to indulge in the negative emotions and unable to escape; therefore, perceived stress may fully mediate the association between epidemic risk perception and depression. However, the cognitive features of anxiety is characterized by excessive attention bias to specific negative stimuli, reflecting the activity of the fear system, thus there may have been other factors such as worries about the future that also could explain the link between epidemic risk perception and anxiety. The results of the present study demonstrate perceived stress is the main underlying mechanism that explains the effect of perceived risk on mental health. When people are exposed to negative life events, such as the COVID-19 pandemic, concerns about current terrible situations and future adverse consequences may lead to a lot of psychological stress, which in turn activate an individual's diathesis or vulnerability, transforming potential diathesis into a reality of psychopathology (Monroe and Simons, 1991). The relationships among stress, anxiety, and depression mainly lie in the subjective perception of pain and lack of ability to cope with stress (Hewitt et al., 1992). If stress could be effectively alleviated, negative emotions and mental symptoms will be avoided easily.

The current study found that FTP moderates the relationship between perceived stress and depression. Compared with individuals with negative future orientation, those with positive future orientation are relatively weaker in perceiving the impact of stress on depression. According to the diathesis-stress theory (Monroe and Simons, 1991), perception of future self and the world is the direct cause of depression. Individuals with a position future orientation can maintain optimism and hope for the future when an epidemic occurs (Chin and Holden, 2013; Pallini et al., 2016). Thus, they are likely to have more adaptable behaviors in stressful situations, which contribute to alleviate the effects of stress on depression. However, individuals with a negative future orientation hold a negative attitude toward the future. When facing stressful situations, they will be easily trapped in the pain of the past and present, further exacerbating their depression (Holman et al., 2016).

In this study, we found that confidence in society can moderate the relationship between perceived stress and anxiety. Individuals with high confidence in society can avoid excessive



**FIGURE 1** | Interactive effects of future positive and perceived stress on depression.



**FIGURE 2** | Interactive effects of confidence in society and perceived stress on anxiety.

anxiety under environmental threats and stress. According to Bandura (1997) and Luszczynska et al. (2009), beliefs (such as self-efficacy) play an important role in human behaviors and mental health, and confidence in society is similar to a sense of collective efficacy, which is an individual's positive belief in society's ability to deal with threats (Keller et al., 2011). The unexpected COVID-19 pandemic brought varied risks and dangers in people's lives, and has become a source of uncertainties and tension. In such a setting, individuals with high confidence in society have positive expectations for the future, and believe that the society is capable of coping with threats to achieve a sense of certainty and control, thereby avoiding tensions and maintaining calm. In contrast, individuals with low confidence in society are more emotionally vulnerable, and tend to be nervous and anxious when faced with an epidemic. It should be noted that confidence in society is not an irrational belief but a positive illusion that makes it easier for people to cope with difficult life situations (Bandura, 1998). Individuals with high confidence in society can fully recognize the causes of danger without overestimating risks, and thus are able to remain calm and are more likely to take effective preventive measures as necessary.

In sum, the present study supports that perceived stress mediates the link between epidemic risk perception and mental health, and that FTP and confidence in society are both important variables of psychological buffer with which individuals deal with stress from the epidemic and effectively reduce the adverse effects of perceived stress on mental health. These results help to better explain how and when epidemic risk perception leads to depression and anxiety and provide theoretical guidance and inspiration for studies on epidemic intervention. First, perceived stress is an important mechanism by which the risk perception of unexpected public crisis event affects mental health, and stress relief is an important means for reducing mental problems. It is well known that fear stems from uncertainties; therefore, helping people gain necessary epidemic knowledge about COVID-19, such as epidemic characteristics, prevention and control measures, etc., would transform uncertainties into understanding, thereby correcting the perception of threat events and false beliefs to better predict future results and cope with environmental threats (Peters et al., 2017). Previous studies have found that social skills are correlated with a decrease in stressful experiences, and that people with strong social skills gain more social supports when faced with stress (Segrin et al., 2007); therefore, they should communicate with family and friends over the phone or the Internet to encourage one another and strengthen mutual mental support to alleviate tension and psychological stress. Second, correct understanding of the impact of the epidemic and a positive belief in the future are effective ways to reduce depression. Crises are always accompanied by dangers as well as opportunities. Although the COVID-19 pandemic has caused huge losses, it has also reminded all sectors of society to pay attention to physical and mental health and the prevention and control of epidemics, which offers experiences of reference value for similar events in the future. Individuals should strengthen self-management and adjustment, adopt a dialectical approach to crises, and establish a correct and positive conception of the future to maintain mental health. Furthermore,

it is necessary to attach importance to the improvement and cultivation of confidence in society. The public's judgment on confidence in society is mainly based on the past performance of the society (Keller et al., 2011) as well as the positive role of the government and the media. When individuals feel a lack of control during an epidemic, the government and social organizations should provide sufficient guarantees and supports to allow them to feel that society is still functioning with order and certainty, thereby avoiding anxiety and panic. In addition, the media's coverage of crisis events is the main source from which people obtain epidemic-related information. Negative news reports often lead to negative emotional experiences among people. Therefore, the media should pay attention to positive and favorable news about responses to the crisis from all walks of life, and ensure objectivity and scientific nature of media information in guiding people to correctly understand the impact of epidemic crisis events, and cultivate optimism, positive emotions, and positive attitudes toward the future.

Despite its strengths, this study has some limitations. With a questionnaire survey targeting the nationwide public, only about 700 entries of data were collected in the study. As the sample size was relatively small, the distribution was uneven with respect to region (small sample from Hubei province), education level (bachelor's degree and above accounted for 82.3%), and personal status in the epidemic (few participants representing those in quarantine, frontline medical workers, and community service workers). Second, the study was not conducted in special regions and among special groups. Future research should pay more attention to people in quarantine, frontline medical workers, community service personnel, etc. For instance, more attention should be paid to the mental health of people in Wuhan, as the COVID-19 started in Wuhan and most of the infected cases in China were also found in Wuhan. Instead of self-isolation of other areas, people in Wuhan were forcibly quarantined to confirm whether they have become sick and minimize the risk of them passing on the infection to others. During the period of the quarantine, fear of infection with a fatal disease, the lack of information, frustration and boredom, lack of supplies, and not being able to go to work or earn an income could lead to problems in both mental and physical health (Brooks et al., 2020). People in Wuhan also suffer a lot of social stigma, which may lead to worse psychological problems than people in other regions. Third, only one item was used to measure overall risk perception in the present study. While it could be useful to use an item to measure overall risk perception, the current study did not distinguish the effects of different aspects of risk perception (uncertainty about threats and severity of consequences) on perceived stress and mental health. Future research could benefit from improving this tool. Finally, as cross-sectional design was used, this study did not track the mental health of people during the epidemic and had inadequate understanding of the public's emotional or mental changes during the period of epidemic outbreak. Therefore, causal relations among variables could not be confirmed, and future research should adopt longitudinal design and interventional experiments to provide better assistance for building mental health in times of crises.

## CONCLUSION

The present study demonstrated that risk perception of COVID-19 was significantly correlated with depression and anxiety. Perceived stress was established as a mediator of epidemic risk perception and depression/anxiety. Future time perspective was found to moderate the effect of perceived stress on depression and social confidence was found to moderate the effect of perceived stress on anxiety.

## DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of Faculty of

Psychology at Southwest University. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

HL and XL designed the study idea and research framework. XL contributed to the data collection, data analysis, and writing. HL contributed to manuscript writing and modification. Both authors read and approved the manuscript.

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# The Relationship Between the Duration of Attention to Pandemic News and Depression During the Outbreak of Coronavirus Disease 2019: The Roles of Risk Perception and Future Time Perspective

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Since the outbreak of coronavirus disease 2019 (COVID-19) in China, people have been exposed to a flood of media news related to the pandemic every day. Studies have shown that media news about public crisis events have a significant impact on individuals' depression. However, how and when the duration of attention to pandemic news predicts depression still remains an open question. This study established a moderated mediating model to investigate the relationship between the duration of attention to pandemic news and depression, the mediating effect of risk perception, and the moderating effect of future time perspective on the relationship. In early February 2020, 701 individuals from 29 provinces, autonomous regions, and municipalities across China were asked to self-report their duration of attention to pandemic news, level of depression, risk perception, and future time perspective during the COVID-19 outbreak. Results show that there is a significant positive correlation between the duration of attention to news on COVID-19 and depression; risk perception mediates the association between the duration of attention to pandemic news and depression; and future time perspective plays a moderating role between risk perception and depression. The findings of the present study provide theoretical implications and practically throw some light on alleviating the public's depression during pandemic periods. We highlight that the individual's hope for a better future, focusing on positive news, and time perspective balance during an epidemic disease are also beneficial to promoting positive emotion and reducing depression.

**Keywords:** COVID-19, duration of attention to pandemic news, depression, risk perception, future time perspective

## INTRODUCTION

The pandemic of novel coronavirus disease (COVID-19) is raging across the globe and has become a worldwide public health crisis (Bao et al., 2020). Being confronted with major catastrophic events, the public not only suffers from threats to their lives and safety but also faces psychological impact and even psychological trauma. The occurrence of major disasters has a great adverse impact on people's mental health, leading to negative emotions such as tension, panic, and depression (Hobfoll et al., 2006; Lau et al., 2010). For example, a recent study by Wang et al. (2020), which included 1,210 participants from 194 cities in China during the initial stage of the COVID-19 outbreak, showed that 53.8% of the participants rated the psychological impact of the pandemic as moderate or severe. According to the study of Serafini et al. (2020), various psychological problems and serious consequences in terms of mental health including stress, anxiety, depression, frustration, and uncertainty emerged progressively during this pandemic. More importantly, the public displayed more vicarious traumatization than front-line medical staff (Li et al., 2020). Previous studies have shown that most public perceptions of public crisis events come from the media, which in turn affects public response to those events (Lau et al., 2010). Therefore, the effect of media news on the public's physical and mental health is an issue of particular concern.

As the pandemic was emerging, various news related to the pandemic also exploded. The WHO declared a COVID-19 "infodemic"—"an overabundance of information, some accurate and some not that makes it hard for people to find trustworthy sources and reliable guidance when they need it" (World Health Organization, 2020). Furthermore, cues that are vague, inadequate, unfamiliar, contradictory, numerous, or lacking information prompt uncertainty (Budner, 1962; Mishel, 1984). Therefore, when individuals are faced with a large amount of news about the pandemic, it is difficult for them to distinguish right from wrong and make a judgment. Accordingly, they may feel a sense of uncertainty. Uncertainty is a cognitive state that occurs when one cannot construct events well because certain diseases have many unknown factors (Mishel and Braden, 1988). Uncertain viral transmission may take part a crucial and underestimated role in sustaining the epidemic (Sarkar et al., 2020). Many studies directly linked uncertainty to depression (Mullins et al., 2000; Kang, 2006). Swallow and Kuiper (1992) showed that uncertainty is often associated with depression. When uncertainty was evaluated as a danger, it was generally associated with a pessimistic view of events and the future and resulted in harmful outcomes such as anxiety, depression, and distress (Mishel, 1988). People living in a volatile and insecure environment (e.g., an insecure job, unhappy relationship, poverty, etc.) have a high risk of depression (Mcewen, 1998; Peters and Mcewen, 2015). Therefore, the "infodemic" of pandemic news may bring uncertainty, thus leading to depression. We proposed that, during the pandemic, the more time individuals paid attention to news about the pandemic, the higher the level of depression they might feel. Hence, we predicted that:

H1: The duration of attention to pandemic news will be positively correlated with individuals' depression.

Media news also affect individuals' risk perception (Cooper and Nisbet, 2016; Paek et al., 2016). Research has shown that TV news on a series of public health issues (such as cancer, AIDS, heart disease, and smoking) are positively correlated with risk perception (Paek et al., 2016). The theory of social amplification of risk holds that the interaction of risk information through multiple propagation mechanisms and repeated feedback during the transmission process leads to signal amplification, which then enhances individuals' risk perception (Kasperson and Kasperson, 1996). The agenda-setting theory holds that the media can direct people's attention through the degree of emphasis placed on relevant issues, thereby conveying the key points in the communication of the public agenda. For example, if the media repeatedly communicates risk information related to drug usage, individuals might perceive that the issue has become more and more important. Furthermore, their perceptions of risk, sensitivity, and severity are directly related to the degree of media coverage of drug usage (Gelders et al., 2009). In summary, it could be inferred that during the pandemic of COVID-19, various real-time pandemic news reports and related information have been communicated frequently and repeatedly to the public through multiple transmission mechanisms, which caused the public's risk perception to rise dramatically. Accordingly, this study predicted:

H2: The duration of attention to pandemic news will be positively related to risk perception.

In addition, risk perception, as an important variable affecting mental health, refers to a subjective assessment of the likelihood of threat events (Slovic, 1987; Li et al., 2009). Brewer et al. (2007) proposed that risk perception includes three components: uncertainty (probability of being injured by danger), susceptibility (physical vulnerability in the face of danger), and severity (degree of harm caused by danger). Studies on the SARS epidemic and Wenchuan earthquake in China have shown that risk perception is not conducive to people's mental health (Shi et al., 2003; Li et al., 2009). COVID-19 has become a stressor for many people (Li et al., 2020). Lazarus and Folkman (1984) proposed that the consequences of environmental stressors on health depended on the assessment of threats (primary assessment) and the assessment of available personal resources for responding to threats (secondary assessment). Thus, individuals will have a risk perception of the pandemic that is full of uncertainties and a risk perception of uncontrollable and involuntary exposure; such unavoidable situations with loss of control for negative events cause individuals to develop depression disorders (Abramson et al., 1978). As susceptibility (a kind of diathesis) is a negative cognition, the hopelessness theory of depression (Abramson et al., 1989) holds that when exposed to negative life events, people who show negative inferential styles are more likely to make negative judgments when exposed to stressful events and thereby have an increased likelihood of experiencing depression. The severity of public crisis events can also aggravate an individual's depression. For example, during

the SARS outbreak, the level of depression and anxiety among medical staff was higher than that during the prevention period (Chen et al., 2006).

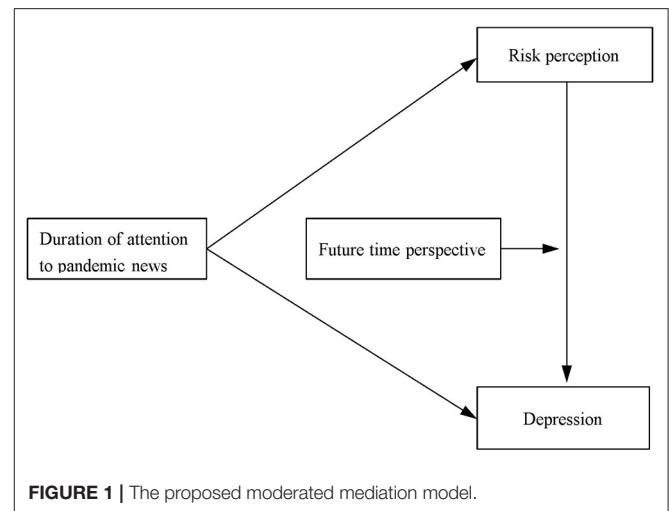
In conclusion, the duration of attention to pandemic news would motivate individuals' depression and risk perception, which, in turn, would also lead to depression. With this view in mind, this study proposed the following predictions:

H3: Risk perception will be positively correlated with individuals' depression.

H4: Risk perception plays a mediating role in the relationship between the duration of attention to pandemic news and depression.

Social cognitive theory holds that, as an important factor affecting mental health (Bandura, 1997; Henshaw and Freedman-Doan, 2009), individual belief is a psychological resource that effectively responds to environmental threats (Keller et al., 2011). Future time perspective (FTP), as a belief for the future, is a relatively stable personality trait that represents individual's cognition of, emotional experience of, and action (action tendency) toward the future (Huang, 2004; Lyu, 2014). Individuals with higher FTP are more optimistic about the future, more confident in achieving future goals, and firmly believe that their current behaviors will help in achieving future goals (Kooij et al., 2018). FTP helps individuals achieve self-adjustment by postponing gratification, and individuals with high FTP could perceive the higher value of delayed rewards so that they are able to focus on the future even in the absence of immediate rewards (Bembenutty and Karabenick, 2004; Lyu and Huang, 2016).

FTP has also been shown to be related to mental disorders (Kooij et al., 2018). In the face of adversity, individuals with higher FTP have greater adaptability and show less depression (Epel et al., 1999), and adolescents with longer FTP have lower depression levels (Diaconu-Gherasim et al., 2017). Conversely, individuals with lower FTP are less clear and more pessimistic about the future and may have greater worries and anxieties about an unpredictable and uncertain future. With the individual's perception of time being as one of the potential predictors of PTSD, traumatic events may cause the individuals to lose expectations for the future, to sink into their current pain and past experience, which can then place their mental health at risk (Holman et al., 2016). The core concept of cognitive behavioral therapy of depression—the “cognitive triad” model of depression—also includes individuals' negative views of the future. The theory holds that for individuals who have negative attitude toward their own abilities and believe that success is impossible and life has no hope, such negative views of the future will lead to depression (Beck and Weishaar, 1989). This suggests that FTP may be an important factor affecting individuals' depression during the pandemic. Allemand et al. (2012) demonstrated the moderating role of FTP in the relationship between tolerance and subjective well-being, and those who believed that the future was open-ended tended to report more life satisfaction and less pessimism than those who perceived their future as restricted. Therefore, FTP may play a moderating role in the relationship between individuals' risk



perception and depression. Studies by Andre et al. (2018) and De Volder and Lens (1982) show that those who believe the future is open-ended tend to score higher in positive emotions and in the sense of life and lower in negative emotions (Hicks et al., 2012). Therefore, higher FTP may help facilitate positive emotions of individuals, ease negative emotions under a stressful environment of risk perception, and then mitigate depression. Hence, this study predicted:

H5: FTP may play a moderating role in the relationship between risk perception and depression.

In sum, the current study aims to investigate the mediating effect of risk perception in the relationship between the duration of attention to pandemic news and depression during the outbreak of COVID-19, as well as the moderating effect of FTP on this mediating effect. The hypothetical model is shown in **Figure 1**.

## MATERIALS AND METHODS

### Participants and Procedure

Due to the infectivity of the novel coronavirus, this study adopted a cross-sectional online survey (in Mandarin) with Survey Star (wjx.cn), a platform providing functions equivalent to Amazon Mechanical Turk. The questionnaires were released on February 6th, 2020, through WeChat platform during the outbreak of COVID-19 in China. As of February 15, 2020, 701 participants from China completed the questionnaires. All participants consented to participate in the study after being informed about the purpose of the study, and the investigation was approved by the Faculty of Psychology at Southwest University. Among all participants, 37.8% ( $n = 265$ ) were males and 62.2% ( $n = 436$ ) were females. As for age, 1.4% were under the age of 18, 28.8% were between 18 and 25 years old, 18.0% were between 26 and 30 years old, 22.5% were between 31 and 40 years old, 21.1% were between 41 and 50 years old, 7.6% were between 51 and 60 years old, and 0.6% were over 60 years old.

**TABLE 1** | Distribution of participants' duration of attention to pandemic news.

Rate	N (%)
1 = no attention	4 (0.6)
2 = within 10 min	58 (8.3)
3 = 10 to 30 min	167 (23.8)
4 = 0.5 to 1 h	145 (20.7)
5 = 1 to 2 h	180 (25.7)
6 = 3 to 5 h	120 (17.1)
7 = 6 to 9 h	17 (2.4)
8 = more than 10 h	10 (1.4)

## Materials

### Duration of Attention to Pandemic News

One single item “How long do you browse, read or watch the pandemic news every day?” was used to collect the participants' daily attention to the pandemic news. Ratings were given on an eight-point scale with higher scores indicating longer duration of attention to pandemic news. The distribution of participants' duration of attention to pandemic news is shown in **Table 1**.

### Risk Perception of the Pandemic

We developed a six-item scale to measure individuals' risk perception of COVID-19 according to the study by Brewer et al. (2007). Items are as follows: “I am very worried that my family and I will be infected with the novel coronavirus (uncertainty)”;

“I feel that washing my hands and wearing a mask cannot stop the invasion of the novel coronavirus (susceptibility)”;

“I think the actual numbers of people infected are much higher than the official figures (severity)”;

“I am afraid that I will be infected with the novel coronavirus (uncertainty) when I go out”;

“When it is necessary to go out (such as purchasing daily necessities), I will be far away from the crowds (serious impact on life)”;

and “I am afraid to touch things touched by others, such as supermarket receipts, elevator buttons, etc. (serious impact on life).” All items were rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Higher scores reflect an increased perceived risk of the pandemic situation. The Cronbach's alpha score of the scale was 0.74.

### Future Time Perspective

The Chinese version of the ZTPI Future Subscale (Lyu et al., manuscript under review; Zimbardo and Boyd, 1999) was used to measure FTP. This scale contains five items, rated on a five-point Likert scale (from 1 = very uncharacteristic to 5 = very characteristic). Sample items were as follows: “When I want to accomplish something, I will set a goal and consider specific ways to achieve it” and “I can usually complete the plan step by step.” In this study, the Cronbach's alpha score of the scale was 0.86.

### Depression

We adopted the Center for Epidemiological Studies Depression scale (CES-D; Andresen et al., 1994) to assess depressive symptoms. The CES-D has 10 items, which are rated on a four-point scale from 0 (rarely or none of the time) to 4 (most or all

the time) based on how often participants felt that way in the previous 2 weeks, with higher scores indicating more depression. Sample items were as follows: “Even though my family and friends helped me, I couldn't get rid of my depression” and “I feel that my life is a failure.” The Cronbach's alpha in this study was 0.84.

## Statistical Analysis

IBM SPSS Statistics 22.0 was used for data entry, sorting, and analysis. We used model 4 of the Hayes (2017) PROCESS macro to examine the mediation effect of risk perception and model 14 to examine the moderating effect of FTP. Bootstrapping (5,000 bootstrap samples) with 95% confidence intervals (CIs) was conducted to test the significance of indirect effects (Hayes, 2017). The 95% CIs did not include zero, indicating a significant effect.

## RESULTS

### Correlations Analysis

**Table 2** shows the means, standard deviations, and correlation matrix of each variable. As expected, the duration of attention to pandemic news was positively correlated with risk perception ( $r = 0.13$ ,  $p < 0.01$ ) and depression ( $r = 0.11$ ,  $p < 0.01$ ). Also, there were a significant positive correlation between risk perception and depression ( $r = 0.26$ ,  $p < 0.01$ ) and a significant negative correlation between FTP and depression ( $r = 0.32$ ,  $p < 0.01$ ). These results provided preliminary support for our hypotheses. Moreover, gender and age were associated with duration of attention to pandemic news, risk perception, depression, and FTP, so they were included as control variables in the following analysis.

### Mediation Analysis

We used a series of regression analysis to test our hypotheses. As shown in **Table 3**, after the effects of gender and age had been controlled, the duration of attention to pandemic news emerged as positively related to both risk perception ( $B = 0.13$ ,  $SE = 0.04$ ,  $p < 0.01$ , model 1) and depression ( $B = 0.14$ ,  $SE = 0.04$ ,  $p < 0.01$ , model 3), thereby supporting Hypotheses 1 and 2. When controlling for the duration of attention to pandemic news, risk perception was positively related to depression ( $B = 0.26$ ,  $SE = 0.04$ ,  $p < 0.01$ , model 2), so Hypothesis 3 was supported. Moreover, bootstrapping indicated that the mediation effect of risk perception was significant [ $B = 0.03$ ,  $SE = 0.01$ , Boot 95% CI (0.01, 0.06)]. Taken together, risk perception mediated the relationship between the duration of attention to pandemic news and depression. Thus, Hypothesis 4 was supported.

### Moderated Mediation Analysis

Controlling for age and gender, we conducted the moderated mediation analysis. As shown in **Table 4**, the interaction (model 5) between risk perception and FTP significantly predicted depression ( $B = -0.07$ ,  $SE = 0.03$ ,  $p < 0.05$ ), suggesting that FTP moderated the effect of risk perception on depression. In order to more clearly interpret the interactive effect of FTP and risk perception on depression, FTP scores were divided into



**TABLE 2 |** Means, standard deviations, and correlations.

Variable	M	SD	1	2	3	4	5	6
1. Duration of attention to pandemic news	4.33	1.37	1					
2. Risk perception	3.56	0.73	0.13**	1				
3. Depression	1.83	0.48	0.11**	0.26**	1			
4. FTP	3.62	0.71	0.07	0.03	-0.32**	1		
5. Gender	1.62	0.49	-0.04	0.10*	0.04	-0.05	1	
6. Age	3.58	1.36	0.17**	0.03	-0.16**	0.25**	-0.25**	1

*N* = 701. Internal consistency reliabilities in the diagonal. Gender: 1 = male, 2 = female. Age: 1 = under 18, 2 = 18 to 25, 3 = 26 to 30, 4 = 31 to 40, 5 = 41 to 50, 6 = 51 to 60, 7 = over 60.

\**p* < 0.05; \*\**p* < 0.01 (two tailed).

**TABLE 3 |** Testing the mediation effect of risk perception on depression.

Predictor variable	Model 1 (risk perception)	Model 2 (depression)	Model 3 (depression)
	<i>B</i> (SE)	<i>B</i> (SE)	<i>B</i> (SE)
Gender	0.12 (0.04)**	-0.03 (0.04)	-0.02 (0.04)
Age	0.04 (0.04)	-0.19 (0.04)***	-0.18 (0.04)***
Duration of attention to pandemic news	0.13 (0.04)***	0.10 (0.04)**	0.14 (0.04)***
Risk perception		0.26 (0.04)***	
<i>R</i> <sup>2</sup>	0.03	0.11	0.04
<i>F</i>	6.94	20.72	9.88

*N* = 701. Bootstrap sample size = 5,000.

*B*, unstandardized regression coefficients.

\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001.

**TABLE 4 |** Testing the moderated mediation effect of FTP on depression.

Predictor variable	Model 4 (risk perception)	Model 5 (depression)
	<i>B</i> (SE)	<i>B</i> (SE)
Gender	0.12 (0.04)**	-0.03 (0.04)
Age	0.04 (0.04)	-0.11 (0.04)**
Duration of attention to pandemic news	0.13 (0.04)***	0.11 (0.04)**
Risk perception		0.26 (0.04)***
FTP		-0.32 (0.04)***
Risk perception * FTP		-0.07 (0.03)*
<i>R</i> <sup>2</sup>	0.03	0.20
<i>F</i>	6.94	29.31

*N* = 701. Bootstrap sample size = 5,000.

*B*, unstandardized regression coefficients.

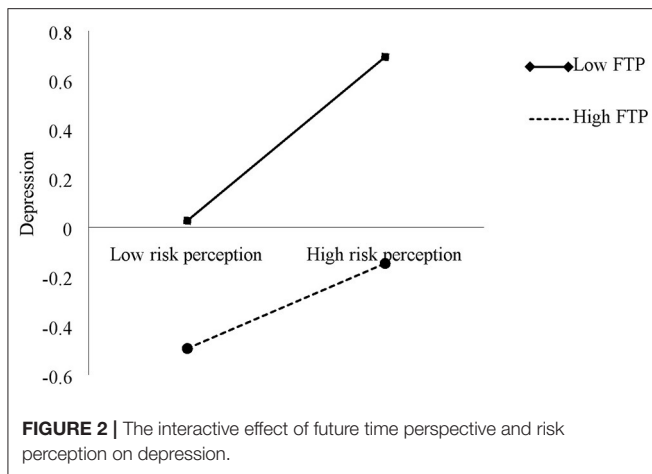
\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001.

high and low groups according to plus or minus one standard deviation. We conducted a simple slope analysis to examine the predictive effect of risk perception on depression at high and low FTP levels. Simple slope tests (Figure 2) suggested that for individuals with high FTP level, risk perception has a significant predictive effect on depression [*B* = 0.20, *SE* = 0.05, 95% *CI* (0.10, 0.29)]; for individuals with low FTP level, risk perception is also a significant predictor of depression [*B* = 0.33, *SE* = 0.05, 95% *CI* (0.24, 0.41)]. The positive effects of risk

perception on depression were stronger for those respondents with low FTP. It was found that the interaction term between FTP and risk perception significantly predicted depression. For depression, the index of moderated mediation was -0.01 [95% *CI* (-0.02, -0.00), excluding zero]. When the level of FTP was high, the duration of attention to pandemic news had a significant indirect effect on depression through risk perception [*B* = 0.03, *SE* = 0.01, 95% *CI* (0.01, 0.05)]; when the level of FTP was low, the duration of attention to pandemic news also had a significant indirect effect on depression through risk perception [*B* = 0.04, *SE* = 0.02, 95% *CI* (0.01, 0.07)]. The positive effects of the duration of attention to pandemic news on depression through risk perception were stronger for those respondents with low FTP. Thus, Hypothesis 5 was supported.

## DISCUSSION

In this study, we found that there was a significant positive correlation between the duration of attention to pandemic news and depression. Xu and Sattar (2020) also found that there was a positive correlation between pandemic information from media and panic, which indicates that the news of the pandemic has an important impact on individuals' physical and mental health. During the pandemic, the public generated a lot of negative emotions, such as panic and depression. Specifically, since COVID-19 is an emerging, infectious, and unknown disease, there is a lack of knowledge about it. Under the implementation



of the isolation measures, the public mostly formed their perception and understanding of the pandemic through news media. Faced with the “infodemic” of pandemic news, on the one hand, it is difficult for individuals to judge the authenticity of the news and form an accurate cognition. On the other hand, in the early stages of the pandemic, many contradictory news in the media led people to doubt the valid information. They also even doubted the official data because of the prevailing rumors (Xu and Sattar, 2020). Therefore, surrounded by various pandemic news, it is difficult for people to find trustworthy sources and reliable guidance. With individuals getting more news about the pandemic, they still cannot accurately understand the epidemic itself, its consequences, and its prevention and control, which lead them to feel uncertainty (Xu and Sattar, 2020). Uncertainty, as we all know, is one of the important factors that lead to depression (Swallow and Kuiper, 1992). Therefore, as H1 predicted, the duration of attention to pandemic news is positively correlated with individuals’ depression.

Few studies have been done to investigate the psychological mechanism of the effect of duration of attention to pandemic news on depression. The current study showed that the duration of attention to pandemic news has a predictive effect on people’s risk perception, and according to the theory of social amplification of risk and agenda setting, the duration of attention to pandemic news will increase people’s risk perception (Gelders et al., 2009; Paek et al., 2016). For example, when receiving reports of the rapid growth of confirmed cases from the media, which exacerbates individuals’ risk perception, people may overestimate their possibility of infection on the one hand and put in place more protective measures on the other hand, such as wearing masks, washing hands frequently, and staying away from crowds, which are all behaviors that follow after intensified risk perception. Behind these behaviors, the media’s coverage of tragic events has resulted in people’s emotional changes, which has caused them to frequently overestimate the frequency of risks and other adverse events (Johnson and Tversky, 1983). From the perspective of the dual process theories, emotion is exactly the basis of a heuristic system, and relying on intuitive emotions is a faster, easier, and more effective way of judgment,

especially in complex, uncertain, and even dangerous situations (Slovic and Peters, 2006). Therefore, individuals often use initial emotional impressions of information to judge risk (Cooper and Nisbet, 2016). By this line of reasoning, the emotions conveyed *via* media reports are important factors influencing individuals’ risk perception. News information that triggers fear is more likely to intensify individuals’ level of risk perception. Thus, there is a positive correlation between fear and risk perception (Paek et al., 2016). Moreover, when the media reports contain emotional vocabulary, they may create an alternative experience, causing similar emotional experiences between the public and the victim (Kupchik and Bracy, 2009). Therefore, the emotional information (such as fear and alternative experiences) conveyed by news media during the pandemic will affect public’s perception of risks.

The present study showed that risk perception also had a significant direct predictive effect on depression, which is consistent with the hopelessness theory (Abramson et al., 1989) and the diathesis–stress model (Monroe and Simons, 1991). First of all, the possibility of danger is uncertain. When an individual has not developed a cognitive schema for the disease event, vague, insufficient, and unfamiliar information helps the individual perceive an uncertainty and, thus, cannot accurately predict the results. Uncertainty is considered to be a risk, not an opportunity; with risk assessment positively correlated with depression and opportunity assessment negatively correlated with depression, uncertainty affects depression through risk assessment (Kang, 2006). The hopelessness theory (Abramson et al., 1989) points out that when people are exposed to negative life events, those who exhibit negative inferential styles are more likely to suffer from depression. The diathesis–stress model also proposes that stress may activate an individual’s diathesis or vulnerability, transforming potential diathesis into a reality of psychopathology, and thus, the impact of stress on depression risk depends on diathesis (Monroe and Simons, 1991). Amid this pandemic, the individuals’ perception of the uncertainty of infection, their diathesis, and the serious consequences that may occur after infection have affected their levels of depression. Therefore, risk perception plays a mediating role between the duration of attention to pandemic news and depression. As individuals spend more time being exposed to pandemic news, their risk perception is also higher, which in turn leads to an increase in the levels of depression.

We also found that FTP plays a moderating role in the indirect relationship between the duration of attention to pandemic news and depression, and FTP can buffer the impact of risk perception triggered by the duration of attention to pandemic news on depression. As FTP increases, the indirect effect of the duration of attention to pandemic news on depression through risk perception weakens. The motivational role of FTP is not only reflected on the cognitive and behavioral levels but also on the emotional level. The more optimistic individuals are about the future, the more confident they are in achieving future goals (Shipp et al., 2009). These positive feelings about the future can alleviate the effects of negative emotions caused by risk perception on depression. Moreover, the greater an individual’s risk perception, the greater the pressure will be

(Webster et al., 1988). Zhao et al. (2020) found that during the COVID-19 pandemic, perceived stress was positively associated with anxiety. The level of FTP can affect an individual's pressure perception (Fookan, 1982). The weaker an individual's feeling of time control, the greater the perceived pressure (Nonis et al., 1998). Therefore, higher levels of FTP can alleviate the pressure caused by an individual's perception of risks and thereby reduce the level of depression. In a word, FTP plays a negative moderating role in the indirect relationship between the duration of attention to pandemic news and depression.

The results of this study provide insight for reducing the level of depression among the public during the pandemic and in other major emergencies in the future. First, the findings show that the information conveyed by news reports could affect an individual's level of depression. This conclusion helps to understand the impact of media exposure on an individual's psychological distress during major crisis events, which provides valuable contributions to the ongoing improvement of news media work. On the one hand, the official information helps to reduce people's concerns about the continued development of the situation. For example, previous research shows that positive news information after an earthquake has a protective effect against the continued development of depression and suicidal thoughts (Lau et al., 2010). Moreover, Khajanchi and Sarkar (2020) apply the model to forecast the development of COVID-19 pandemic in India, which suggests that media effect can play a key role in mitigating the transmission of COVID-19. By this line of reasoning, the media should not only report quickly and accurately but also balance the coverage of positive and negative news. On the other hand, the duration of attention to pandemic news may lead to uncertainty, which aggravates individuals' depression. Zhang et al. (2020) have shown that participants who spent more time watching TV and on cellphones or computers were significantly more likely to report elevated stress; those who participated in family entertainment activities were significantly less likely to report elevated stress. Therefore, when the news surges, individuals should attempt to reduce their attention to it and divert their attention to other topics or activities (such as watching entertainment programs, developing hobbies and interests, upgrading personal skills, and spending quality time with family) aimed at alleviating negative emotions. Second, accurate understanding of risks is also an important way to maintain mental health. Individuals should pay attention to official information from formal channels and should not make unfounded speculations or exaggerate the severity of the pandemic and other events. Individuals should also develop an objective and scientific understanding of the pandemic situation, reduce the perceived uncertainty, and develop a sense of control. In order to mitigate uncertainty, individuals should seek to change negative perceptions and develop positive coping behaviors and, thus, reduce risk perception and tendency toward depression. Finally, FTP shows a negative moderating role in the indirect relationship between the duration of attention to pandemic news and depression. Given the plasticity of FTP (Kooij et al., 2018), it is very important to intervene with FTP. Specifically, individuals should be trained to shift their time focus, engage in more positive future thinking, and enhance the

role of positive emotions. With the negative news environment surrounding the pandemic, individuals can be instructed to extend their timeline to the future and feel the malleability of the future in order to balance the current negative emotions. The individual's good hope for the future and the confidence in winning the battle against COVID-19 are conducive to promoting positive emotion and reducing depression caused by the negative emotion under the pandemic.

This study has some limitations that should be considered. First, due to its cross-sectional nature, this study could not determine the causal relationship between variables by longitudinally tracking changes during the pandemic. It is suggested that future research should examine causal relationships among variables through a longitudinal study. Second, the study measured the duration of attention to pandemic news but did not distinguish among negative, positive, and neutral information; different types of information may have different effects on risk perception. For example, among the negative information that is closely related to individuals, information concerning whether there is a confirmed case in the same community can most affect the individuals' risk perception (Shi et al., 2003). Therefore, future research needs to explore the impact of different types of information on risk perception and their internal mechanisms. Third, the sample selection was biased, as the sampling did not take into account a balance of different regions. The severity of the pandemic varied greatly in different regions of the country; thus, we should be cautious about generalizing the research results to other regions. Finally, this study did not examine whether individual FTP is also affected by the pandemic, as the view of time will change with personal and situational factors (Kooij et al., 2018). Therefore, future research should further test the interaction and effect of FTP and pandemics.

## CONCLUSION

The current study found that there is a significant positive correlation between the duration of attention to pandemic news and depression, and risk perception plays a mediating role in the relationship between them. FTP plays a moderating role between risk perception and depression, and individuals with high FTP have a weaker positive effect on depression than those with low FTP.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the corresponding authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Faculty of Psychology at Southwest University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## AUTHOR CONTRIBUTIONS

HL designed the research framework and contributed to manuscript writing and modification. LW contributed to the data analysis and writing. XL contributed to the data collection and manuscript modification. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Factors Influencing Public Panic During the COVID-19 Pandemic

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The coronavirus disease 2019 (COVID-19) pandemic has been regarded as a public health emergency that caused a considerable degree of public panic (such as anxiety and insomnia) during its early stage. Some irrational behaviors (such as excessive search for information related to the pandemic and excessive hoarding of supplies) were also triggered as a result of such panic. Although there has been plenty of news coverage on public panic due to the outbreak, research on this phenomenon has been limited. Since panic is the main psychological reaction in the early stage of the pandemic, which largely determines the level of psychological adaptation, time of psychological recovery, and the incidence of PTSD, there exists a demand to conduct investigation on it. From a public governance perspective, the government's assessment of public panic may affect the efficiency and effectiveness of pandemic prevention and control. Therefore, it is of obvious practical significance to investigate public panic during the COVID-19 pandemic and analyze its influential factors. The self-compiled COVID-19 Social Mentality Questionnaire was used to collect data from a total of 16,616 participants online, and 13,511 valid responses were received. The results from the chi-square test showed that there were differences in gender, educational level, age, pandemic-related knowledge, self-efficacy, risk level, and objective social support. Furthermore, multiple linear regression analysis results showed that self-efficacy, gender, educational level, age, risk level, pandemic-related knowledge, and objective social support were significant predictors of public panic. Among the research variables, self-efficacy, gender, educational level, and age were negative predictors of panic while risk level, pandemic-related knowledge, and objective social support were positive predictors of panic.

**Keywords:** COVID-19, panic, pandemic-related knowledge, self-efficacy, risk, objective social support

## INTRODUCTION

The coronavirus disease 2019 (COVID-19) is a respiratory infection transmitted by airborne droplets and close contact caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The World Health Organization (WHO) declared the novel coronavirus pneumonia outbreak a "public health emergency of international concern" on January 31, 2020, Beijing time. As of May 24, there were 5.29 million confirmed cases and 342,306 deaths worldwide. COVID-19 not only threatens people's health and safety, but also has a profound impact on people's lives and work.

The COVID-19 pandemic typically brings stress to the general public. According to the stress theory, stress refers to a series of physiological, psychological and behavioral reactions that occur when people face harmful substances, threats, and challenges inside and outside, and know that such stimuli will pose a threat to them after their own subjective evaluation (Folkman and Lazarus, 1984). The causes of these reactions are called stressors. Studies have pointed out that in various major stress events, infectious diseases not only have a more lasting impact on human physiology, but also produce a variety of adverse psychological reactions in victims (Li and Hua, 2003). In the face of the pandemic, people often experience negative emotions such as anxiety, fear, depression and, in severe cases, some somatic symptoms (Chinese Association for Mental Health, 2020), which have negative impacts on people's physical and mental health as well as their future life. Although there has been a lot of news about panic during the pandemic, there have been very few studies on public panic. Since panic is an important psychological response to COVID-19, it largely determines the level of subsequent psychological adaptation, time of psychological recovery, and incidence of PTSD. Therefore, in order to overcome the novel COVID-19 as soon as possible, it requires not only the efforts of medical researchers and the professional treatment of front-line medical staff, but also the trusted scientific evidence and knowledge of psychological researchers to provide the public with science-based guidelines to establish a positive social mentality to avoid excessive panic caused by the pandemic (Castelnuovo et al., 2020).

The COVID-19 pandemic, as a public health emergency, is also an emergent risk event for the public. It has the typical characteristics of high-risk events and causes a considerable degree of panic in the society (such as anxiety and insomnia etc.). According to the risk perception theory (Slovic, 1987), a risk event can be interpreted as a "signal"; the nature of the "signal" and the conditions of its transmission process will influence the receivers' feelings and reactions toward the event. Usually, people rely on their intuition to know and make judgments about risk events, which is called risk perception. Svenson (1988) proposed the mental model of risk, believing that individuals will form different mental models due to their differences in knowledge, experience and other individual characteristics, thus forming a unique perception and value judgment of risk events. Therefore, in the process of forming public risk perception from a risk signal, two factors are involved. First, the characteristics of risk events themselves; second, the receivers' personal characteristics, such as their personality or cognitive biases. The interaction among these characteristics will also produce a certain effect. People's risk perception of crisis events can be measured from two dimensions: familiarity and controllability. The high risk end is perceived as "unknown and uncontrollable." Previous studies found that if risk factors can be classified according to their nature, their risk characteristic dimensions can be significantly correlated. For example, a factor perceived as a voluntary risk is often perceived as controllable; a risk factor perceived as unknown is often perceived as a factor of high anxiety. In the case of COVID-19, on the one hand, the massive, collective stressor of a pandemic far exceeds the capacity of individuals and communities to respond; on the other hand, as

COVID-19 is an emerging infectious disease, information about its source, post-infection detoxification time, and pathogenesis is still unclear, which further exacerbates its "uncontrollability." In previous studies on SARS, Shi and Hu (2004) pointed out that information related to the pandemic, such as etiology, route of transmission and cure rate, is an effective indicator to reflect the controllability of the pandemic, which can significantly affect people's risk perception. Xie et al. (2005) pointed out that the individual characteristics of the public, such as gender, educational background, personality and relevant knowledge, are the conditions for the "signal" transmission process of risk events. They affect the individual's ability and willingness to accept risk events, and when such exceeds the individual's tolerance, it will produce adverse psychological reactions such as panic and even lead to some irrational behaviors, such as excessive search for information related to the pandemic, excessive hoarding of food, and blind use of drugs. Therefore, this study intends to explore the influence of factors such as gender, educational background, risk level, social support, pandemic knowledge and self-efficacy on public panic during the pandemic period. This study aims to analyze the causes of public panic by exploring the influencing factors, help the government in conducting counseling and achieving control, and lay a foundation for subsequent psychological reconstruction.

## MATERIALS AND METHODS

### Samples

In this study, a convenient sampling method was adopted to carry out a survey in Henan province using the online platform wjx.cn from 17:00 January 27, 2020 to 17:00 January 29, 2020. The questionnaire was uploaded to the platform, which automatically generates a network link. The link was then posted via the researcher's social media account and the organization's website, inviting people to answer the questions and forward the questionnaire. Excluded the close contacts, a total of 16,616 questionnaires from general public were collected in this study, with 1,551 questionnaires from medical workers and 1,554 questionnaires answered in less than 200 s or by one aged less than 16 years or more than 100 years old, which were deleted. A total of 13,511 valid questionnaires were left, with a response rate of 81.3%. The samples cover 18 cities in Henan Province, China. Among the participants, there are 4,267 males (31.6%) and 9,244 females (68.4%), their average age are  $32.10 \pm 11.11$ , with the largest being 77 years old and the youngest 16 years old. Among the participants, 2,930 (21.7%) have a high school education and below, 2,761 (20.4%) have a junior college degree, and 7,820 (57.9%) have a bachelor's degree or above. 1,900 (14.1%) have healthcare workers in their family, while 11,611 (85.9%) had none.

### Measures

The self-compiled COVID-19 Social Mentality Questionnaire was used as a measurement tool in this study (Chen et al., 2020). The questionnaire was compiled by psychological professors and doctoral students at the early stage of the COVID-19 pandemic after referring to previous researches on the Severe

Acute Respiratory Syndrome (SARS) epidemic and relevant literature on sudden public health events (Qian et al., 2003; Shi et al., 2003; Shi and Hu, 2004; Xu et al., 2005; Xie et al., 2009). The questionnaire has six contents: (1) risk level during the COVID-19 pandemic, (2) social support during the COVID-19 pandemic, (3) knowledge of COVID-19, (4) self-efficacy in seeking help during the COVID-19 pandemic, and (5) the public panic during the COVID-19 pandemic. After determining the basic framework, the team members modified and improved the questionnaire through several discussions, and screened and integrated questions that were similar. Psychological scholars and postgraduates were then invited to conduct a pilot test, and the questionnaire was refined and processed according to their feedback, which was used to formulate the final questionnaire. The final questionnaire was then uploaded to the online platform wxj.cn and was tested among a large population.

### Risk Level

Risk level is measured by a self-rated question that asks, “Have you found any cases or suspected cases of COVID-19 around you?” The answer “yes” is scored as 1, and the answer “no” is scored as 0.

### Objective Social Support

Objective social support is measured by a self-rated question that asks, “whether someone in the family is a health care worker.” The answer “yes” is scored as 1, and the answer “no” is scored as 0.

### Pandemic-Related Knowledge

The sub-questionnaire “Cognition Questionnaire on COVID-19 Pandemic” in the self-compiled COVID-19 Social Mentality Questionnaire was used as the measurement tool for pandemic-related knowledge. The questionnaire mainly consisted of 8 items, which respectively examined the cognition of the participants on the characteristics of COVID-19 infection, the main symptoms, the route of transmission, the knowledge of prevention and the difference between the symptoms and the common cold/flu, as well as the research progress related to the disease and the development stage of the pandemic (see **Appendix 1**). The score range is from 0 to 8; “very unclear” and “relatively unclear” answers are counted as 0, and “very clear” and “relatively clear” answers are counted as 1, then the total score is calculated. The Cronbach’s alpha for this questionnaire was 0.697.

### Self-Efficacy

The sub-questionnaire “The Public’s Self-Efficacy in Seeking Help During the COVID-19 Pandemic” in the self-compiled COVID-19 Social Mentality Questionnaire was used as the measurement tool for self-efficacy. The public’s self-efficacy during the pandemic includes four items, which respectively examine people’s information acquisition efficacy, information identification efficacy, medical treatment acquisition efficacy and psychological assistance acquisition efficacy. The answer “yes” is counted as 1 score, “no” and “uncertain” as 0, then the total score is calculated. The Cronbach’s alpha for this questionnaire was = 0.750.

### Public Panic

Projection measurement was used to measure public panic. The proportion of people around the participants that felt panic actually reflected the degree of panic of the subjects themselves. Participants were asked to answer the question, “How many people around you feel panic about COVID-19?” The 5 Likert scale was adopted, which indicated the participants’ panic from low to high.

### Data Analysis

SPSS 25.0 was used to analyze the collected data, and a descriptive analysis was used to describe public panic and other studied variables. Chi-square test was used to examine the existing differences in panic under different factors. Multivariate stepwise regression was conducted to explore how public panic was affected by other research variables.

## RESULTS

### The Distribution of Panic Among the Population During COVID-19

As shown in **Table 1**, generally 7,291 (53.96%) people thought that more than half of the people around them experienced panic, while only 1,442 (10.67%) people thought that people around them did not. The mean of public panic was 2.99 and the standard deviation was 1.28. Chi-square test results showed that there were significant differences in the public panic mood in terms of gender ( $\chi^2 = 115.09, p < 0.001$ ), age ( $\chi^2 = 515.14, p < 0.001$ ), educational background ( $\chi^2 = 462.59, p < 0.001$ ), objective social support ( $\chi^2 = 28.97, p < 0.001$ ), risk level ( $\chi^2 = 59.01, p < 0.001$ ), pandemic knowledge ( $\chi^2 = 111.46, p < 0.001$ ), and self-efficacy ( $\chi^2 = 263.36, p < 0.001$ ).

### Correlation Analysis

The descriptive statistics and correlation matrix of each research variable are shown in **Table 2**. Panic is significantly and positively correlated with objective social support ( $r = 0.023, p < 0.01$ ) and risk level ( $r = 0.055, p < 0.01$ ), and is negatively correlated with gender ( $r = -0.086, p \leq 0.01$ ), age ( $r = 0.044, p < 0.01$ ), educational background ( $r = 0.030, p < 0.01$ ), and efficacy ( $r = 0.125, p < 0.01$ ). There was no significant correlation between panic and pandemic knowledge.

### Multivariate Regression Analysis

In order to further study the influencing factors of public panic under the COVID-19 pandemic, we took panic as a dependent variable and conducted multiple linear regression analysis with gender, age, education, objective social support, risk level, pandemic knowledge and self-efficacy as independent variables. The stepwise method was used to determine the main factors and the criteria was set as “Probability-of-F-to-enter  $\leq 0.05$ , Probability-of-F-to-remove  $\geq 0.10$ .” As shown in **Table 3**, among the seven models obtained by stepwise regression, the  $R^2$  (0.028) value of the 7th model was the highest, which was selected as the final model. Multivariate regression analysis



**TABLE 1** | Descriptive statistics and Chi-square test of public panic.

		Panic ( <i>N</i> = 13,511, <i>M</i> = 2.99, <i>SD</i> = 1.28)					$\chi^2$
		None ( <i>n</i> = 1,442)	A small part ( <i>n</i> = 4,778)	About half ( <i>n</i> = 1,730)	A large part ( <i>n</i> = 3,551)	Basically all ( <i>n</i> = 2,010)	
Gender	Female	867(60.1%)	3,126(65.4%)	1,209(69.9%)	2,596(73.1%)	1,446(71.9%)	115.09***
	Male	575(39.9%)	1,652(34.6%)	521(30.1%)	955(26.9%)	564(28.1%)	
Age	<i>M</i> ± <i>SD</i>	33.65 ± 11.23	32.70 ± 11.56	29.82 ± 10.73	31.60 ± 10.73	32.28 ± 10.48	515.14***
Education	<i>M</i> ± <i>SD</i>	2.11 ± 0.86	2.45 ± 0.77	2.52 ± 0.73	2.41 ± 0.81	2.13 ± 0.89	462.59***
Social support	No	1,302(90.3%)	4,094(85.7%)	1,468(84.9%)	3,010(84.8%)	1,737(86.4%)	28.97***
	Yes	140(9.7%)	684(14.3%)	262(15.1%)	541(15.2%)	273(13.6%)	
Risk level	Low	1,417(98.3%)	4,551(95.2%)	1,612(93.2%)	3,339(94.0%)	1,874(93.2%)	59.01***
	High	25(1.7%)	227(4.8%)	118(6.8%)	212(6.0%)	136(6.8%)	
Pandemic-related knowledge	<i>M</i> ± <i>SD</i>	6.54 ± 1.56	6.65 ± 1.35	6.66 ± 1.41	6.60 ± 1.36	6.55 ± 1.42	111.46***
Self-efficacy	<i>M</i> ± <i>SD</i>	3.16 ± 1.23	2.98 ± 1.28	2.79 ± 1.34	2.65 ± 1.40	2.69 ± 1.41	263.36***

\*\*\**P* < 0.001.**TABLE 2** | Descriptive statistics and correlation analysis of research variables (*N* = 13,511).

	<i>M</i> ± <i>SD</i>	1	2	3	4	5	6	7	8
1. Gender	0.32 ± 0.47	1.000							
2. Age	32.08 ± 11.09	0.039**	1.000						
3. Education	2.36 ± 0.82	−0.049**	−0.102**	1.000					
4. Social support	0.14 ± 0.35	−0.009	0.019**	0.111**	1.000				
5. Risk level	0.05 ± 0.22	−0.010	−0.078**	0.060**	0.045**	1.000			
6. Pandemic-related knowledge	6.61 ± 1.39	−0.040**	0.035**	0.099**	0.043**	−0.032**	1.000		
7. Self-efficacy	2.85 ± 1.34	0.093**	0.018**	0.012	0.034**	−0.043**	0.298**	1.000	
8. Panic	2.99 ± 1.28	−0.086**	−0.044**	−0.030**	0.023**	0.055**	−0.010	−0.125**	1.000

\*\**P* < 0.01.

results show that risk level ( $\beta = 0.048$ ,  $p < 0.001$ ), pandemic knowledge ( $\beta = 0.030$ ,  $p < 0.01$ ), and objective social support ( $\beta = 0.029$ ,  $p < 0.01$ ) can positively predict panic, while self-efficacy ( $\beta = -0.125$ ,  $p < 0.001$ ), gender ( $\beta = -0.073$ ,  $p < 0.001$ ), and education ( $\beta = -0.045$ ,  $p < 0.001$ ), age ( $\beta = -0.041$ ,  $p < 0.001$ ) negatively forecast panic.

## Markov Chain Monte Carlo (MCMC) Bayesian Estimation

Compared with the maximum likelihood estimation, the Bayesian estimation could benefit to evaluate the complicated likelihood functions and posteriors in model estimation. According to Washington et al. (2011), when the posterior estimates in a model are resulted from the statistical likelihood and the prior with a random sample, the Bayes' theorem would be adopted to estimate the model. Therefore, a standard Markov Chain Monte Carlo (MCMC) sampling method is needed to simulate the posterior densities of the model under the Bayesian framework. However, as the model was intractable in analysis, following the suggestions of Bolduc et al. (2005), a MCMC Bayesian estimation was applied to conduct the posterior inferences of the results from stepwise regression in this paper. As shown in **Table 4**, the results of stepwise regression were consistent with the positive and negative coefficients of

explanatory variables in the results of MCMC method, and the difference was not significant. In stepwise regression, coefficients of explanatory variables other than age were all within 95% Credible Interval of MCMC method.

## DISCUSSION

Public panic is an objective response to major risk events occurring on the public, but it is negative in nature and often causes more harm than good. If the spread of public panic cannot be controlled in a timely manner, it may cause a negative chain reaction, which will not only adversely affect the stability and management of the whole society, but also hinder the prevention and control process of the pandemic. Therefore, analyzing the influencing factors of public panic under the pandemic situation could help people find ways to overcome panic and help administration departments make scientific decisions and carry out pandemic prevention and control more effectively.

### Overview (Profile) of the Public Panic

The COVID-19 outbreak has had a huge psychological impact on the population. From the psychological projection perspective (Cai and Shen, 2010), sometimes people unconsciously reflect

**TABLE 3 |** Multivariate regression analysis of the influencing factors of public panic.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	$\beta$ (95%CI)	<i>t</i>	$\beta$ (95%CI)	<i>t</i>	$\beta$ (95%CI)	<i>t</i>	$\beta$ (95%CI)	<i>t</i>	$\beta$ (95%CI)	<i>t</i>	$\beta$ (95%CI)	<i>t</i>	$\beta$ (95%CI)	<i>t</i>
Self-efficacy	-0.125 (-0.135, -0.103)	-14.616***	-0.118 (-0.128, -0.096)	-13.777***	-0.116 (-0.126, -0.094)	-13.541***	-0.115 (-0.125, -0.094)	-13.465***	-0.115 (-0.125, -0.093)	-13.415***	-0.124 (-0.135, -0.101)	-13.836***	-0.125 (-0.135, -0.102)	-13.922***
Gender			-0.075 (-0.252, -0.160)	-8.758***	-0.075 (-0.252, -0.159)	-8.735***	-0.076 (-0.256, -0.164)	-8.939***	-0.075 (-0.253, -0.161)	-8.793***	-0.073 (-0.247, -0.155)	-8.538***	-0.073 (-0.247, -0.155)	-8.523***
Risk level					0.049 (0.184, 0.375)	5.753***	0.051 (0.196, 0.387)	5.997***	0.048 (0.180, 0.371)	5.66***	0.049 (0.184, 0.375)	5.742***	0.048 (0.177, 0.368)	5.597***
Education							-0.035 (-0.082, -0.029)	-4.164***	-0.039 (-0.088, -0.035)	-4.589***	-0.042 (-0.093, -0.040)	-4.919***	-0.045 (-0.098, -0.045)	-5.252***
Age									-0.039 (-0.006, -0.003)	-4.567***	-0.040 (-0.007, -0.003)	-4.711***	-0.041 (-0.007, -0.003)	-4.817***
Pandemic-related knowledge											0.031 (0.012, 0.045)	3.453**	0.030 (0.012, 0.044)	3.376**
Social support													0.029 (0.043, 0.167)	3.334**
$R^2$	0.016		0.021		0.024		0.025		0.026		0.027		0.028	
$\Delta R^2$	0.016		0.006		0.002		0.001		0.002		0.001		0.001	
<i>F</i> change	213.640***		76.708***		33.091***		17.34***		20.859***		11.923**		11.116**	

\*\* $P < 0.01$ , \*\*\* $P < 0.001$ , Dependent Variable: Panic.

**TABLE 4 |** Results of Markov Chain Monte Carlo (MCMC) Bayesian estimation.

	Mean	SD	95% credible interval
Self-efficacy	-0.12	0.01	(0.14, -0.10)
Gender	-0.05	0.01	(-0.06, -0.04)
Risk level	0.07	0.01	(0.04, 0.09)
Education	-0.04	0.01	(-0.05, -0.02)
Age	0.00	0.00	(0.00, 0.00)
Pandemic related knowledge	0.06	0.02	(0.02, 0.09)
Objective social support	0.03	0.01	(0.01, 0.04)

Dependent Variable: Panic.

their emotions, attitudes and thoughts toward external things or others. Therefore, the perceived panic around a certain subject may reflect a certain degree of unawareness of one's own feelings of panic. The results of this study showed that 89.33% of the public believed that someone around them experienced panic, and the average measurement of public panic was  $2.99 \pm 1.28$  ( $M \pm SD$ ), indicating a high level of panic. Due to the lack of clear understanding and control over COVID-19, the theory of psychological stress explains that COVID-19 is a relatively serious stress event for both social groups and individuals. The conclusions are consistent with the relevant studies during the SARS period. Shi and Hu (2004) found through investigation that in the early stage of SARS, people often made irrational evaluations on the current situation and consequences of the epidemic, which led to panic. Xie et al. (2005) indicated that the level of psychological anxiety of the public generally increased during the SARS epidemic, and majority of the public's psychological anxiety turned into psychological panic due to the failure to receive effective feedback. It can be seen that panic is a normal and objective response to a major epidemic, yet, this seemingly completely negative emotional response actually has some positive meaning. Studies have shown that in life-threatening situations, negative emotions narrow the range of individual's momentary thought-action repertoire, improve people's ability to act quickly and firmly, and thus increase the survival probability of individuals, which has evolutionary significance (Xie, 2019).

Therefore, the purpose of dealing with the negative emotional reaction such as panic should not be aimed at total elimination, but to carry out reasonable guidance for such emotion, so that people can not only maintain reverence for nature, but also protect their mental health. Here, it is suggested that the administrative departments must actively encourage scientific research on psychological changes of the public during the pandemic, and formulate reasonable policies to effectively channel the public's panic, maintain social stability and speed up the process of fighting against the pandemic.

## The Role of Self-Efficacy

The results show that self-efficacy can negatively predict panic, that is, the higher an individual's level of self-efficacy, the less likely they are panic. According to the social cognitive theory, self-efficacy is the degree to which an individual is confident

in his or her ability to complete a task or behavior; whether a person can engage in a certain activity smoothly and successfully is affected by his self-efficacy because an individual's feeling of self-efficacy restricts their motivation level, behavior mode of activities and various psychological levels (Bandura et al., 1999). The self-efficacy investigated in this study is described as one where, during the COVID-19 pandemic, an individual initiates a request for help, and during the request process, the prediction of the outcome of the request reflects the individual's confidence level to complete it. In the process of seeking help, individuals with high self-efficacy can further improve their problem-solving ability and have more confidence when facing tasks and difficulties in the future (Williams and Takaku, 2011). At the same time, individuals with high self-efficacy will perceive more positive effects of help-seeking behavior, so their psychological cost in the process of help-seeking is also relatively low (Nadler, 1991). They are more likely to seek help to relieve stress (Aspinwall and Taylor, 1992), which helps reduce their anxiety, depression, panic and other emotional problems caused by situational factors, and maintain their emotional stability.

In this regard, it is recommended that the government should further broaden the channels of medical and psychological assistance for the public, encourage more social forces to invest in the fight against COVID-19, and transmit positive social energy while employing correct adverse actions in the fight against COVID-19 to show determination to overcome the pandemic, thereby boosting public confidence to increase the effectiveness of the fight against the pandemic.

## The Role of Gender

Gender is an effective indicator of panic; women are more likely to panic in the face of a pandemic. It may be related to the personality traits of women, such as sensitivity (Su and Wang, 2014). Therefore, when experiencing changes in their social environment, women are more likely to perceive the emotional state and changes of the people around them, making them feel more panic. It may also be related to the cognitive characteristics of females. Studies have shown that females are dominant in the emotional and intuitive dimensions, while males are dominant in the ideological and sensory dimensions (Peng et al., 2006). Therefore, women's emotions are more likely to be affected by stressful events. During the SARS epidemic, some researchers found that the degree of panic, stress intensity and stress influence of female college students were significantly higher than male college students (Yin et al., 2003). In addition, according to the emotional contagion theory (Doherty, 1997), women have higher emotional sensitivity than men; therefore, in a pandemic, women are more susceptible to being emotionally affected by the people around them, leading to panic and other negative emotions. It is consistent with the results of this study, which showed that the proportion of female college students who perceived panic around them is significantly higher than that of male college students (Zhao et al., 2020).

It is suggested to pay attention to the differences between different gender groups, fully understand their psychological needs, and carry out targeted psychological assistance.

## The Role of Risk Level

Risk level can also effectively predict panic, that is, the higher the risk level, the greater the possibility of panic. According to the mental model of risk (Svenson, 1988), when the risk faced by an individual exceeds the level of acceptance, a strong physical and mental reaction may occur, such as panic, anxiety and other adverse psychological reactions. The degree of risk perceived by an individual is negatively correlated with its geographic location; the farther the location of the pandemic, the lower the degree of risk. Because the geographical location of COVID-19 is close to people, it is also a reflection of psychological distance. Therefore, when confirmed/suspected cases appear around individuals, people will feel more danger and threat, and the emotional reaction of panic and anxiety will be stronger (Qian et al., 2003; Xie et al., 2009). Previous research has also confirmed this conclusion; Qian et al. (2003) found that during the SARS epidemic, when SARS first appeared in their city, people's negative emotions increased significantly, and when SARS appeared in the school, company or community, the spatial and psychological distance between SARS and the people was further reduced, and people showed more tension, fear, pessimism and helplessness.

The current situation of the COVID-19 pandemic worldwide is still very serious, thus, the government should adopt active prevention and control policies and concentrate its efforts on high-quality allocation of resources on the basis of science. Meanwhile, all sectors of society should work together, help each other, exchange needed goods and make joint efforts to reduce the risk level.

## The Role of Education and Age

Education background and age can also negatively predict panic, that is, the more highly educated people are, the less likely they panic, and the older the people are, the less they panic. In this study, samples were taken in the early stage of the pandemic outbreak, which was also a time when information was expanding rapidly and everyone was in an information storm. According to the signal theory (Spence, 2002), a large amount of information flooding in a short time produces information explosion. Information noise brought by a large amount of uncertainty and information redundancy causes information damage, thus disturbing people's ability to differentiate information (Miao and Zhu, 2006). In addition, the pandemic is an extraordinary period, and this special situational factor naturally becomes a condition for the formation and living space of rumors. Highly educated participants tend to have higher cognitive level, more information acquisition channels and stronger information collection ability (Xu et al., 2005), which helps them identify misinformation more effectively, obtain practical and effective coping strategies, avoid being misled by rumors and reduce unnecessary panic. Moreover, the aging rate of memory of highly educated people is low (Feng, 2005). The memory of overcoming SARS also brings them more positive mental motivation, which buffers their feelings of panic about COVID-19.

In terms of age, the research results show that age and educational background are significantly positively correlated, that is, the older the subjects are, the higher their educational background is. Combined with the previous discussion, it explains why the older the participants are less likely to panic. In addition, according to the social learning theory, individual concepts of reality are derived from the process of comparative verification of these concepts against some other real criteria (Bandura, 1986). In the same fuzzy information condition, for individuals with direct experience, although the direct experience itself is not pleasant or even compulsive, the direct experience will provide the individual with corresponding objective feelings, which can often correct the unnecessary psychological panic caused by information ambiguity (Xie et al., 2005). In this study, the older subjects may have experienced SARS, H1N1 and other infectious diseases, and the accumulated knowledge and experience makes them more informed and confident in coping with COVID-19, resulting in less panic.

## The Role of Pandemic-Related Knowledge and Objective Social Support

Surprisingly, pandemic-related knowledge and objective social support can positively predict panic, that is, people with more pandemic-related knowledge and objective social support are more likely to panic. However, reviewing the literature, it is found that the results are consistent with previous studies.

First of all, in terms of pandemic-related knowledge, the sampling time of this study was in the early outbreak of the pandemic, and it could not be ruled out that some participants misjudged rumors as knowledge, thus their panic level was relatively high. Shi and Hu (2004) pointed out in their study that the relevant information in the early stage of the pandemic had a strong negative effect on the public, which would significantly increase the public's perception of risk. Moreover, according to the social learning theory, the individual's conception of reality is derived from the process of comparative verification of these concepts and some other real standards (Bandura, 1986). Therefore, personal experience is of great significance to risk cognition, and subjects without direct personal experience are more likely to be induced by external information and thus produce corresponding psychological responses (Wiegman et al., 1991). Qian et al. (2003) conducted a survey of the Beijing population during the SARS epidemic and found that in the first 2 weeks of the outbreak, due to the explosion of all kinds of information and people's lack of knowledge about SARS and the epidemic, people could not effectively distinguish facts and rumors and were inevitably misled. Therefore, the more information they received, the more panic they felt. In addition, Xie et al. (2005) pointed out that for individuals without direct experience, when the information provided by the outside world is not of clear guiding significance, individuals are likely to have adverse psychological reactions such as anxiety and panic. Moreover,



at the outbreak period of the pandemic, information closely related to the public itself and negative information were of utmost concern to the public. At the beginning of a crisis event, the public tends to make a judgment on the risk of the event based on objective indicators such as the frequency of the occurrence and the severity of the consequences, which naturally leads to negative emotions such as panic (Shi et al., 2003).

In terms of objective social support, an operational definition of objective social support in this study is, "Is there anyone in the family engaged in medical care?" In the background of a major pandemic, the medical staff are fighting in the front line of resistance to the disease, and especially under the highly contagious COVID-19, the concern of family members for the occupational health of medical staff may result to a certain level of anxiety. Moreover, according to the spillover theory (Staines, 1980), medical workers are likely to share what they have seen and heard at the front line with their families; combined with the uncertainty of various information during the pandemic period, it is very likely that their families will experience a strong sense of panic.

Thus, it is recommended to adopt a diversified approach to spread accurate and timely information about the COVID-19 pandemic, repel rumors with factual reporting, and reduce panic among the public. Besides, in order to reduce the impairment of rumors and misinformation, it is highly necessary to call for psychological research to reveal the public's cognition towards the COVID-19 pandemic in time (Castelnuovo et al., 2020).

## CLINICAL IMPLICATIONS

Combined with the results, here are proposed three clinical recommendations for the general public during the COVID-19 pandemic.

First, it is a normal emotional response to feel panic when facing with great dangers, such as during COVID-19, and such response can help people staying away from dangers. When panic occurs, accept the existence of the emotion is initial and essential, and then make every effort to seek and practice the scientific solution, that is, adopt the standard science-based self-protection implements. For example, stay at home and do not to going out, gathering and visiting others. Besides, it is an obligation to wear a medical surgical/protective facial mask if someone has to go outside. Further, washing hands in accordance with the Seven-step method frequently, keeping the room ventilated, and eat fully cooked food during the COVID-19 pandemic are crucial personal protections. The proper personal protection can greatly reduce the risk of being infected.

Second, in the early stage of pandemic, people often panic because of excessive attention to the pandemic and ineffective screening of misinformation. Here, it is suggested to acquiring the pandemic-related knowledge/information through the authoritative media. A clear and objective understanding of the development of the pandemic can help people to reduce panic. Meanwhile, in times of emergency, the greatest

contribution to society is to manage oneself well without spreading or believing rumors.

In addition, studies have shown that only the pandemic-related knowledge acquisition is insufficient in reducing panic, rather than that, making the public to be more aware of the prevention and control measures seems to be more important to confine the pandemic (Liu et al., 2004), as it can effectively improve people's self-efficacy, thereby reducing the damage of COVID-19 pandemic to the people's mental health (Wang et al., 2020). At present, scientific analysis and interpretation of COVID-19 related information, guidance of public opinion correctly, clear prevention methods are of great importance to improving the psychological state of the public. In the long term, it is strongly recommended to improve people's public health literacy (Huang et al., 2015).

## LIMITATION

Due to the limitations of the overall sample size and the actual situation, this study adopts the on-line convenient sampling method. Therefore, due to the sample distribution, the representativeness is limited. The number of previous studies available for reference was limited owing to the unexpected and unknown nature of the COVID-19 pandemic; moreover, as time was limited, the self-compiled questionnaire used in this study was relatively crude. In addition, this study adopts a cross-sectional study design, which cannot fully reflect the psychological development of the public during the pandemic. It is suggested that future studies should adopt a longitudinal study design or mixed study design, in order to conduct a comprehensive and in-depth study of the psychological development of the public in emergencies.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Henan University Institutional Review Board. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## AUTHOR CONTRIBUTIONS

YL and SW were the principal investigators for the study, generated the idea and designed the study. XN and KF were the primary writers of the manuscript, and approved all changes. KF and SW supported the data input and data analysis. YL and XN supported the data collection. All authors were involved in developing, editing, reviewing, and providing feedback for

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## APPENDIX 1

The 15 items involved in this study are listed below:

Objective social support: “Is someone in your family a healthcare worker?”

Public panic: “How many people around you feel panic about COVID-19?”

Risk level: “Are there confirmed or suspected cases in your area?”

Pandemic-related knowledge:

- a) Do you know the main symptoms of COVID-19?
- b) Do you know how COVID-19 is transmitted?
- c) Do you know the difference in symptoms between COVID-19 and the common cold?
- d) Are you aware of the current pandemic?
- e) Are you aware of current research progress on COVID-19?
- f) Do you think wearing a mask can prevent COVID-19 infection?
- g) Do you know how to wash your hands properly?
- h) Do you think that the behaviors of dining and gathering is at risk of COVID-19 infection?

Self-efficacy:

- a) I am sure I have the resources I can use to gain knowledge about COVID-19.
- b) I’m sure I know how to distinguish the rumor from the truth.
- c) I’m sure I know how to get proper medical treatment if I need it.
- d) I’m sure I know how to get the proper psychological services if I need it.



# The Unprecedented Movement Control Order (Lockdown) and Factors Associated With the Negative Emotional Symptoms, Happiness, and Work-Life Balance of Malaysian University Students During the Coronavirus Disease (COVID-19) Pandemic

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**Background and Aims:** Malaysia's first Movement Control Order (MCO) or "lockdown" was in place for 6 weeks to curb the spread of coronavirus disease (COVID-19). Consequently, all universities were forced to close temporarily with abrupt changes to teaching and learning activities. However, there has been a lack of consensus regarding students' actual psychological status and mental health during the MCO implementation. This study investigates the link, state, and differences of negative emotional symptoms, happiness, and work-life balance among university students during the COVID-19 pandemic.

**Methodology:** This study recruited 1,005 university students across Malaysia. Data was collected online using Qualtrics to measure negative emotional symptoms (The Depression, Anxiety, and Stress Scale), happiness (The Oxford Happiness Inventory), and work-life balance (Work-Family Conflict Scale). All data was analyzed using SPSS version 25 and AMOS version 26 using *T*-test, ANOVA, logistic regression analyses, and path analysis method.

**Findings:** Findings indicated that 22, 34.3, and 37.3% of the university students scored moderate to extremely severe levels of stress, anxiety, and depression symptoms, respectively. Half scored rather happy or very happy (50%) for happiness levels. Meanwhile, 50.4 and 39.4% scored high to very high levels of work-to-family and family-to-work conflict. Significant differences in stress, anxiety, depression, happiness, work-family conflict, and family-work conflict were recorded across different demographic factors. Happiness was found to be a protective



factor with a lesser likelihood of experiencing severe stress (OR = 0.240, 95% CI: 0.180, 0.321), anxiety (OR = 0.336, 95% CI: 0.273, 0.414), and depression (OR = 0.121, 95% CI: 0.088, 0.165) with higher happiness levels. Higher score of work-to-family conflict contributes to greater odds of having severe levels of anxiety (OR = 1.453, 95% CI: 1.161, 1.818). While greater likelihood of developing severe stress (OR = 1.468, 95% CI: 1.109, 1.943) and severe anxiety (OR = 1.317, 95% CI: 1.059, 1.638) under increasing score of family-to-work conflict. Besides, happiness is found to negatively linked with lower negative emotional symptoms, while work-family conflict and family-work conflict are positively linked with higher negative emotional symptoms.

**Conclusion:** Lockdown implementation during the COVID-19 pandemic appears to have a significant impact on university students' negative emotional symptoms, happiness, and work-life balance. Happiness was found to be a protective factor while the state of work-life balance is a risk factor that can predict students' negative emotional symptoms.

**Keywords:** anxiety, depression, students, lockdown, COVID-19 pandemic, stress, happiness, work-life balance

## INTRODUCTION

On 11 March 2020, the World Health Organization declared the coronavirus disease (COVID-19) a global pandemic resulting in many countries worldwide having to enforce unprecedented lockdown measures to curb the spread of novel virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). As of 31st December 2020, the virus has killed more than 1.8 million people worldwide, causing spiking fears, anxiety, and state of panic which result to various well-being and socioeconomic concerns among human population (1). Due to its substantial impact worldwide, new research on the psychological, behavioral, interpersonal, and clinical implications toward high-risk population and different contexts are imperative (2). On 25th January 2020, Malaysia had the first three positive cases of COVID-19. On 16th March 2020, Malaysia's Prime Minister has officially announced the unprecedented Movement Controlled Order (MCO), in response to the pandemic. The order promulgates restriction of social activities under the Prevention and Control of Infectious Diseases Act 1988 and the Police Act 1967. During the MCO period, only essential businesses were allowed to operate while most service sectors including schools and higher institutions suspended all physical activities. Concurrent with the steady increase of daily cases, the full MCO implementation has been extended twice, accumulating to a total of 6 weeks since the 1st date of enforcement has taken place.

A rapid review of previous outbreaks suggests that a state of isolation or restricted access measures has severe effects on individual psychological condition such as posttraumatic stress symptoms, confusion, and anger caused by various conditions such as fears of infection, frustration, boredom, inadequate supplies or information, financial loss, and stigma (3). Likewise, recent studies during the COVID-19 pandemic have also provide evidences of indirect adverse mental health impact of the virus (4, 5). Early evidence suggests that the impact of COVID-19 is beyond massive contraction of global economic activities,

similarly pointing to the degrading quality in health and well-being (6). While this will leave no sector in any country unaffected, the socioeconomic impact in all education sectors from preschool to tertiary education has been reported (7).

Young adults and educated individuals are particularly found to be more vulnerable to mental distress based on recent studies (8, 9). In addition, the conditions of disrupted daily life and delays in academic activities were positively linked to the declining of students' mental health condition (10), rising unhappiness, and conflict (11). However, despite serious attention given to this topic, there has been a lack of consensus drawing on university student population with existing data skewed toward certain countries. The unprecedented period of pandemic and restriction order has posed a new challenge toward universities. Many universities took the approach to resume academic activities under remote or online teaching methods while those with lacking resources or preparedness were advised to delay the semester. Studies from previous outbreaks have shown that university students are vulnerable to psychological problems (12–14). There are various factors contributing to the deterioration of student psychological well-being in universities such as fear of dormitory evacuation, event cancellation such as study exchange or uncertainty to graduate and fear of losing future job (15, 16). In addition, factors such as major changes in students' routine and daily life, delayed academic activities, and concern over financial struggle and economic fluctuation were also mentioned which overall might exacerbate the students' psychological condition (10).

Given the sudden consequences (such as online teaching or last-minute change in assessment method) this population is facing in complying with the pandemic control efforts, there is a need to investigate the extent to which the state of the pandemic has affected their negative emotional symptoms, happiness, and work-life balance. This study aims to achieve three objectives (a) to identify the state of negative emotional symptoms, happiness, and work-life balance among university students during the

second and third MCO phases; (b) to compare the state of negative emotional symptoms, happiness, and work-life balance among university students during the second and third MCO phases based on demographic factors; and (c) to investigate the risk and protective factors that can predict the state of negative emotional systems among Malaysian university students. This will serve as an important evidence to inform educational policy and future health promotion interventions for the university students in Malaysia.

## MATERIALS AND METHODS

This study utilized a cross-sectional design using Qualtrics online survey to collect data. Samples were recruited among public and private university students in Malaysia using snowball sampling. Data collection took place within 9 days from 15th April 2020 and ended on 23rd April 2020 when Malaysia was at its second and third phases of MCO. A total of 1,458 responses were retrieved; however, 453 responses were found incomplete making a final 1,005 usable responses. A link to the survey invitation was sent and shared through various social media platforms such as Facebook, WhatsApp, Twitter, and e-mail invitations. The survey was designed using dual languages of Bahasa Malaysia and English. Students in any public or private universities in Malaysia at the time of the study and with no history of psychiatric/mental disorders were eligible to participate.

### Ethical Consideration and Data Collection Procedure

This study has received an ethical evaluation from the Faculty of Arts and Social Sciences, University of Nottingham Malaysia Campus ethics committee (Approval number: FASS2020-0008/DOAP/SKH). A consent form was included in the first page of the survey informing the nature of study, voluntary, and withdrawal terms.

The link or QR code directed potential participants to the research information page and the next consent page. This consent form made clear the commitments and expectations relating to the project (commitments to anonymity and confidentiality, details about uses of data, etc.). The consent form page emphasized a range of issues for which consent was sought, and each participant was asked to indicate their support for each one. All participants were also asked to provide explicit consent by typing "I AGREE" or "SAYA SETUJU."

### Instruments

*Depression, Anxiety, and Stress Scale-21 (DASS-21)* (17). Negative emotional symptoms were assessed using 21-item DASS-21. It consists of depression, anxiety, and stress dimensions with seven items representing each. All items were rated using the scale of 0 to 4—0 (did not apply to me at all), (1) applied to me to some degree or some of the time, (2) applied to me to a considerable degree or a good part of the time, and (3) applied to me very much, or most of the time. Score was calculated using total score multiplied by 2 and further categorized into normal, mild, moderate, severe, or extremely severe levels. Our analyses showed that this scale has good internal consistency using Cronbach's

alpha. The Malay version of DASS-21 scored 0.951 while the English version scored 0.940. The DASS-21 has also been used in previous studies during the COVID-19 pandemic (4, 5, 18).

*Oxford Happiness Questionnaire (OHQ)* (19). The 29-item OHQ was used to measure students' happiness. All items were rated using a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Our analysis recorded good Cronbach's alpha value with the Malay version scoring 0.723 while the English version scoring 0.827.

*Work-family Conflict Scale (WFC)* (20). Work-life balance was measured using a 10-items WFC scale consisting of two subdimensions of work-to-family and family-to-work conflict. The scale was primarily developed for working population. However, as this juncture shows no relevant scale to measure university student's work-related activities (assignment, logbook, lab work, etc.), this scale is therefore used by explaining to the respondents to relate the items with their university's work. For this scale, the Cronbach's alpha is also good with the Malay version recording 0.932 while the English version scored 0.946.

### Statistical Analysis

Data analysis was performed using IBM Statistical Package for Social Science (SPSS) version 25 and AMOS version 26 employing both descriptive and inferential statistics. *T*-test and ANOVA analysis were performed for comparing means between groups according to demographic factors. Meanwhile, multivariate logistic regression analysis was performed to assess potential risk and protective factors for the incidence of severe depression, anxiety, and stress symptoms among participants. Results were presented using odds ratios (ORs) and bias corrected (BC) 95% confidence intervals. Path analysis was performed to examine the link between constructs of the study by observing beta estimates ( $\beta$ ).

### Data Assumptions

Multicollinearity and normality assumptions were assessed using skewness, kurtosis, and Q-Q plot. Following the suggestion by Garson (21), data was meeting the range for acceptable with skewness and kurtosis with  $\pm 2$  for skewness and  $\pm 3$  for kurtosis with a straight diagonal line for Q-Q plot observed.

## RESULTS

### Demographic Profile, Location, and Status at the Period of Lockdown

**Table 1** presents the descriptive characteristics of our participants. In summary, the majority of the respondents were female with 75.5% ( $n = 759$ ), while male participants only made up a total of 24.5% ( $n = 246$ ) from the entire population. Most respondents ( $n = 523$ ) were between 17 and 22 years old. Only 6% were aged 35 years and above ( $n = 60$ ). Results indicated Malay ethnicity representing almost a three-quarter ( $n = 746$ , 74.3%) of the overall population in this study. Public university students recorded 70.2% ( $n = 706$ ), meanwhile only 29.8% were from private universities ( $n = 299$ ).

At the point of data collection, a total of 36.0% of our respondents were located in the central region ( $n = 362$ ), 11.1%

**TABLE 1** | Respondents' demographic characteristics ( $N = 1,005$ ).

Category	F	%	Std	Skewness	Kurtosis
Gender	1,005	100	0.014	-1.189	-0.587
Male	246	24.5			
Female	759	75.5			
Age	1,005	100	0.029	1.883	2.233
17–22 years old	523	52.0			
23–28 years old	376	37.4			
29–34 years old	45	4.5			
35 years old and above	60	6.0			
Ethnicity	1,005	100	0.029	0.077	2.233
Malay	746	74.3			
Chinese	128	12.7			
Indian	47	4.7			
Others	84	8.4			
University	1,005	100	0.014	0.917	-1.162
Public	706	70.2			
Private	299	29.8			
Location at the period of MCO/pandemic	1,005	100	0.045	0.177	-1.355
Central region	362	36.0			
East coast region	112	11.1			
Northern region	139	13.8			
Southern region	327	32.5			
East Malaysia	57	5.7			
Outside Malaysia	8	0.80			
Level of study	1,005	100	0.746	1.947	4.689
Diploma	69	6.9			
Bachelor's degree	774	77.0			
Master's degree	85	8.5			
Doctoral degree	50	5.0			
Field of study	1,005	100	0.514	-0.164	-1.270
Technical	401	39.9			
Non-technical	590	58.7			
Not specified	14	1.4			
Status of resident during MCO/pandemic	1,005	100	0.824	-0.717	-0.262
Staying at hometown	603	60.0			
Staying in-campus	151	15.0			
Staying outside-campus	183	18.2			
Others	68	6.8			
Risk to contagion	1,005	100	0.539	2.239	3.937
High	825	82.1			
Moderate	124	12.3			
Low	56	5.6			

*f*, frequency; %, percentage; std, standard deviation error.

in the east coast ( $n = 112$ ), a total of 13.8% were located in the northern region ( $n = 139$ ), following 32.5% in the southern region ( $n = 327$ ). Those in East Malaysia and outside Malaysia

were represented by 5.7% ( $n = 57$ ) and 0.8% ( $n = 8$ ), respectively. Information for the study program was reclustered into two categories of technical and non-technical programs as defined by the Ministry of Higher Education Malaysia (22). For this, a total of 39.9% were from technical programs ( $n = 401$ ), meanwhile, 58.7% ( $n = 590$ ) were enrolled in non-technical programs. A very small percentage of 1.4% chose not to state their program. Lastly, more than half of our respondents ( $n = 603$ , 60%) were currently at their hometown, 15.0% ( $n = 151$ ) were on campus, meanwhile 18.2 stayed outside campus ( $n = 183$ ).

## Students Levels of Negative Emotional Symptoms, Happiness, and Work-Family Conflict During the Period of COVID-19 Lockdown

Tables 2–4 summarize negative emotional symptoms, happiness, and work-family conflict levels among our respondents. Descriptive statistics were analyzed using mean and frequency in the SPSS. In summary, the result suggests that the majority of students scored normal to mild for stress, anxiety, and depression levels. A total of 7.9, 8.0, and 8.4% scored severe stress, anxiety, and depression levels. This was followed by 2.8, 14.8, and 10.6% who scored extremely severe stress, anxiety, and depression levels (please refer to Table 2). Combining moderate to extremely severe levels altogether, this study found a total percentage of 22.0% of students suffering from stress, 34.3% from anxiety, and 37.3% from depression symptoms.

Table 3 indicated that half of the participating students scored from “rather happy” and “very happy” for happiness. Few students accounted for 11.6% indicating that they were unhappy or somewhat unhappy, 38.4% of our respondents were not particularly happy or unhappy making a total of 50.0% for these three categories.

Meanwhile, results in Table 4 suggested that the majority of students were experiencing low to moderate levels of work-to-family conflict and family-to-work. Those who experienced moderate to extremely high levels of work-to-family conflict accounted for 50.4% from the overall percentage for work-to-family conflict and 39.2% for family-to-work conflict.

## Differences in Students' Level of Negative Emotional Symptoms, Health, Happiness, and Work-Family Conflict Based on Demographic Factors

*T*-test and one-way ANOVA were performed to assess differences in students' level of negative emotional symptoms, happiness, and work-family conflict during the lockdown period based on demographic profiles. Overall test and *post-hoc* results in Tables 5, 6 revealed that there were significant differences in the DASS-S, DASS-A, DASS-D, happiness, W-FC, and F-WC levels across different demographic factors. Detailed results indicated differences in terms of DASS-S mean level for age, location, university type, and ethnicity with the  $p < 0.05$ . Specifically, students from the northern region ( $\mu = 1.679$ ,  $p < 0.001$ ) had lower stress symptoms compared with those in

**TABLE 2 |** Stress, anxiety and depression symptoms severity categorization ( $N = 1,005$ ).

	Normal		Mild		Moderate		Severe		Extremely severe	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
DASS-S	664	66.1	120	11.9	114	11.3	79	7.9	28	2.8
DASS-A	498	49.6	162	16.1	116	11.5	80	8.0	149	14.8
DASS-D	487	48.5	143	14.2	184	18.3	84	8.4	107	10.6

*f*, frequency; %, percentage; DASS-S, stress; DASS-A, anxiety; DASS-D, depression.

<sup>a</sup>Scoring is based on a manual published by (23). After multiplying the scores by 2, the total score was categorized into five; normal, mild, moderate, severe, or extremely severe. Depression was scored with a total score from 0 to 9 for normal, 10 to 13 for mild, 14 to 20 for moderate, 21 to 27 for severe depression, and 28 to 42 for extremely severe depression. Anxiety was calculated based on scores 0–7 normal, 8–9 for mild, 10–14 for moderate, 15–19 for severe, and 20–42 for extremely severe. Lastly, stress was scored from 0 to 14 for normal, 15 to 18 for mild, 19 to 25 for moderate, 26 to 33 for severe, and 34 to 42 for extremely severe.

**TABLE 3 |** Happiness total score categorization ( $N = 1,005$ ).

	Not happy		Somewhat unhappy		Not particularly happy or unhappy		Rather happy		Very happy	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Happiness OHQ	9	0.90	108	10.7	386	38.4	421	41.9	81	8.1

Not happy score is between 0 and 58, somewhat happy score is between 59 and 87, not particularly happy or unhappy score is between 88 and 116, rather happy is between 117 and 145, very happy score is between 146 and 173, and too happy score is 174.

*f*, frequency; %, percentage.

**TABLE 4 |** Work-family conflict and family-work conflict total score categorization ( $N = 1,005$ ).

	Very low		Low		Moderate <sup>a</sup>		High <sup>a</sup>		Extremely high <sup>a</sup>	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
W-FC	102	10.1	396	39.4	302	30.0	148	14.7	57	5.7
F-WC	173	17.2	438	43.6	222	22.1	125	12.4	47	4.7

*f*, frequency; %, percentage; W-FC, work-to-family conflict; F-WC, family-to-work conflict.

<sup>a</sup>Moderate-extremely high defined as W-FC  $\geq 16$ , F-WC  $\geq 16$ . Scoring: 0–5 for very low, 6–10 for low, 11–15 for moderate, 16–20 for high, and 21–25 for very high.

the East Coast ( $\mu = 1.936$ ,  $p < 0.001$ ), central regions ( $\mu = 1.917$ ,  $p < 0.001$ ), and outside the country ( $\mu = 2.298$ ,  $p < 0.001$ ).

For DASS-A, findings indicated that a total of four demographic factors were significant. In detail, private university students ( $\mu = 1.676$ ,  $p < 0.001$ ) generally had a higher anxiety level compared with the public university students ( $\mu = 1.609$ ,  $p < 0.001$ ). Younger students within the age bracket between 17 and 22 years old ( $\mu = 1.667$ ,  $p < 0.001$ ) and 23 and 28 years old ( $\mu = 1.624$ ,  $p < 0.001$ ) had higher symptoms of anxiety compared with more mature students aged 35 and above ( $\mu = 1.377$ ,  $p < 0.001$ ). Students' anxiety levels were also different based on locations where those from East Malaysia region displayed lower anxiety symptoms ( $\mu = 1.386$ ,  $p < 0.001$ ) compared to other regions. Moving on, students' levels of anxiety were different based on risk to contagion level and ethnicity status. Surprisingly, those in the moderate risk area were experiencing higher anxiety symptoms ( $\mu = 1.765$ ,  $p < 0.05$ ) compared with those in the high-risk area ( $\mu = 1.608$ ,  $p < 0.05$ ).

Meanwhile, for DASS-D, depression levels were different based on age and location. Older students aged 35 years old and

above were found to report lower levels of depression ( $\mu = 1.500$ ,  $p < 0.001$ ) compared to younger students aged between 17 and 28 years old ( $\mu = 1.667$ ,  $p < 0.001$ ;  $\mu = 1.624$ ,  $p < 0.001$ ). We also found that students in East Malaysia region were experiencing lesser depression symptoms ( $\mu = 1.681$ ,  $p < 0.001$ ) compared with students in other regions.

Three factors were found significant when comparing students' happiness levels. First, older students tend to be happier (29–34 years old:  $\mu = 4.508$ ,  $p < 0.001$ ; 35 years old and above:  $\mu = 4.590$ ,  $p < 0.001$ ) compared with younger students (19–22 years old:  $\mu = 4.102$ ,  $p < 0.001$ ; 23–28 years old:  $\mu = 4.172$ ,  $p < 0.001$ ). Second, students in the East Malaysia ( $\mu = 4.383$ ,  $p < 0.01$ ) and Northern region ( $\mu = 4.354$ ,  $p < 0.01$ ) tend to be happier than those in other regions. Third, Malay ethnicity recorded highest happiness levels ( $\mu = 2.275$ ,  $p < 0.001$ ) compared with other ethnicities.

Meanwhile, for both work-to-family and family-to-work conflict, only location and ethnicity was found to contribute to significant differences in terms of levels. Specifically, students from the East Coast region recorded the highest W-FC ( $\mu = 2.463$ ,  $p < 0.01$ ) and F-WC ( $\mu = 2.321$ ,  $p < 0.01$ ) compared



**TABLE 5 |** Demographic characteristics by the DASS-S, DASS-A, DASS-D, OHQ, and WFC.

Variable	DASS-S				DASS-A				DASS-D				Happiness				W-FC				F-WC			
	M	±	SD	p	M	±	SD	p	M	±	SD	p	M	±	SD	p	M	±	SD	p	M	±	SD	p
<b>Gender</b>				0.748				0.276				0.418				0.370				0.443				0.826
Female	1.818	±	0.687		1.572	±	0.592		1.902	±	0.760		4.146	±	0.937		2.333	±	1.005		2.128	±	1.011	
Male	1.853	±	0.658		1.642	±	0.631		1.911	±	0.731		4.183	±	0.890		2.315	±	0.995		2.121	±	1.012	
<b>Age</b>				<b>0.012</b>				<b>0.000</b>				<b>0.000</b>				<b>0.000</b>				0.157			0.224	
17–22	1.873	±	0.661		1.667	±	0.643		1.984	±	0.732		4.102	±	0.959		2.338	±	1.028		2.162	±	1.034	
23–28	1.858	±	0.660		1.624	±	0.616		1.898	±	0.753		4.172	±	0.887		2.298	±	0.963		2.095	±	0.973	
29–34	1.633	±	0.663		1.431	±	0.526		1.637	±	0.673		4.508	±	0.847		2.044	±	0.809		1.853	±	0.988	
35>	1.647	±	0.647		1.377	±	0.415		1.500	±	0.543		4.590	±	0.955		2.473	±	1.028		2.167	±	1.053	
<b>Location</b>				<b>0.000</b>				<b>0.000</b>				<b>0.000</b>				<b>0.001</b>				<b>0.004</b>			<b>0.002</b>	
Central	1.917	±	0.679		1.667	±	0.656		1.989	±	0.748		4.024	±	0.884		2.239	±	0.947		2.059	±	0.959	
Northern	1.679	±	0.601		1.437	±	0.520		1.736	±	0.681		4.354	±	0.907		2.137	±	0.946		1.961	±	1.050	
East Coast	1.936	±	0.655		1.786	±	0.663		1.937	±	0.627		4.174	±	0.823		2.463	±	0.992		2.321	±	1.064	
Southern	1.808	±	0.642		1.639	±	0.613		1.910	±	0.769		4.229	±	0.899		2.417	±	1.046		2.208	±	1.016	
East Malaysia	1.713	±	0.682		1.386	±	0.439		1.681	±	0.704		4.383	±	1.036		2.284	±	0.933		1.891	±	0.939	
<b>University type</b>				<b>0.020</b>				<b>0.001</b>				0.466			0.096					<b>0.044</b>			0.275	
Public	1.801	±	0.641		1.609	±	0.598		1.887	±	0.731		4.239	±	0.909		2.377	±	1.017		2.154	±	1.014	
Private	1.962	±	0.708		1.676	±	0.679		1.976	±	0.753		3.998	±	0.863		2.173	±	0.933		2.043	±	1.000	
<b>Residence</b>				0.369				0.350				0.306			0.802					0.390			0.490	
In campus	1.895	±	0.695		1.669	±	0.661		2.031	±	0.743		4.095	±	0.940		2.238	±	0.973		2.062	±	1.013	
Outside campus	1.905	±	0.698		1.604	±	0.634		1.967	±	0.789		4.112	±	0.875		2.411	±	1.006		2.222	±	1.020	
Hometown	1.818	±	0.651		1.620	±	0.610		1.865	±	0.722		4.203	±	0.896		2.326	±	1.009		2.108	±	1.019	
Others	1.801	±	0.616		1.624	±	0.616		1.863	±	0.699		4.261	±	0.929		2.197	±	0.910		2.115	±	0.912	
<b>Study level</b>				0.304				0.091				0.799			0.129					0.625			0.156	
Diploma	1.838	±	0.648		1.641	±	0.610		1.928	±	0.742		4.144	±	0.894		2.174	±	0.944		1.980	±	1.027	
Bachelor	1.854	±	0.664		1.646	±	0.642		1.928	±	0.733		4.381	±	0.912		2.334	±	1.012		2.149	±	1.022	
Master	1.825	±	0.672		1.511	±	0.522		1.798	±	0.796		4.325	±	0.946		2.313	±	0.899		2.002	±	0.938	
Ph.D.	1.733	±	0.670		1.464	±	0.509		1.670	±	0.597		3.990	±	0.841		2.388	±	1.065		2.276	±	1.067	
Others	1.870	±	0.709		1.630	±	0.498		2.080	±	0.847		4.144	±	0.894		2.156	±	0.865		1.980	±	0.664	
<b>Risk to contagion</b>				0.277				<b>0.030</b>				0.680			0.162					0.651			0.459	
High	1.835	±	0.668		1.608	±	0.619		1.907	±	0.743		4.152	±	0.914		2.303	±	0.988		2.101	±	0.995	
Moderate	1.909	±	0.626		1.765	±	0.654		1.920	±	0.697		4.254	±	0.821		2.389	±	1.012		2.225	±	1.043	
Low	1.741	±	0.570		1.561	±	0.580		1.821	±	0.725		4.356	±	0.868		2.271	±	0.964		2.082	±	1.122	
<b>Field of study</b>				0.296				0.806				0.128			0.081					0.219			0.304	
Technical	1.873	±	0.696		1.618	±	0.643		1.955	±	0.768		4.120	±	0.916		2.310	±	1.018		2.118	±	0.994	
Non-technical	1.831	±	0.642		1.631	±	0.609		1.883	±	0.718		4.201	±	0.893		2.337	±	0.987		2.135	±	1.026	
Not specified	1.631	±	0.680		1.529	±	0.631		1.643	±	0.606		4.594	±	0.729		1.871	±	0.687		1.714	±	0.825	

(Continued)

TABLE 5 | Continued

Variable	DASS-S			DASS-A			DASS-D			Happiness			W-FC			F-WC		
	M	± SD	p	M	± SD	p	M	± SD	p	M	± SD	p	M	± SD	p	M	± SD	p
<b>Ethnicity</b>			<b>0.002</b>			0.313			0.209			<b>0.000</b>			<b>0.004</b>			<b>0.008</b>
Malay	1.827	± 0.647		1.666	± 0.631		1.914	± 0.737		2.275	± 0.941		2.376	± 1.009		2.173	± 1.030	
Chinese	1.859	± 0.708		1.433	± 0.554		1.823	± 0.705		2.162	± 0.875		2.245	± 0.951		2.078	± 0.971	
Indian	1.830	± 0.616		1.455	± 0.495		1.823	± 0.702		1.811	± 0.721		1.915	± 0.806		1.706	± 0.725	
Others	1.988	± 0.762		1.638	± 0.643		2.042	± 0.800		2.064	± 0.931		2.152	± 0.989		1.976	± 0.982	

All significant results are marked with bold text ( $p < 0.05$ ).

to other regions. Moreover Malay students recorded the highest for both W-FC ( $\mu = 2.376, p < 0.01$ ) and F-WC ( $\mu = 2.173, p < 0.01$ ) compared with other ethnicities.

### Risk and Protective Factors of Students' Level of Negative Emotional Symptoms During the Period of COVID-19 Lockdown

Multivariate logistic regression was performed using the Enter method to analyze students' risk factors to develop severe to extremely severe level of depression, anxiety, and stress symptoms. A summary of the results is presented in Table 7. Our overall model was significant, suggesting a good fit between data. A total of six predictors were tested: age, level of study, risk to contagion, happiness, work-to-family conflict, and family-to-work conflict. The dependent variables were clustered into two categories. "Zero" referring to a baseline group or cases with normal to moderate levels of negative emotional symptoms while "1" is the observed group referring to cases with severe to extremely severe levels of negative emotional symptoms. The results suggested that demographic factors of age, level of study, and risk of contagion did not predict the odds of occurrence severe or extremely severe stress, anxiety, and depression symptoms. Happiness was found as a protective factor, suggesting that a greater happiness score lowers the odds of experiencing severe to extreme stress (OR = 0.240, 95% CI: 0.180, 0.321), anxiety (OR = 0.336, 95% CI: 0.273, 0.414), and depression (OR = 0.121, 95% CI: 0.088, 0.165). Meanwhile, both work-to-family conflict and family-to-work conflict are found as risk factors for developing severe to extreme levels of different negative emotional symptoms. Detailed results suggest that a higher score of work-to-family conflict increases 1.45 times the odds of suffering from severe to extremely severe anxiety symptoms (OR = 1.453, 95% CI: 1.161, 1.818) while a greater score of family-to-work conflict increases the odds of experiencing severe to extremely severe stress and anxiety symptoms by 1.47 times (OR = 1.468, 95% CI: 1.109, 1.943) and 1.32 times (OR = 1.317, 95% CI: 1.059, 1.683) respectively.

### The Link Between Negative Emotional Symptoms, Happiness, and Work-Family Constructs

To further examine the linkages between constructs in this study, we performed path analysis a subset of SEM technique using AMOS software which overall finding is illustrated in Figure 1. Result suggests that all paths in this study are found significant. Mainly, the increase in happiness level is linked to lower stress ( $\beta = -0.521, p < 0.001$ ), anxiety ( $\beta = -0.387, p < 0.001$ ), and depression ( $\beta = -0.666, p < 0.001$ ) symptoms. Meanwhile, both high work-to-family and family-to-work conflicts are linked to higher stress (W-FC:  $\beta = 0.074, p = 0.036$ ; F-WC:  $\beta = 0.162, p < 0.001$ ), anxiety (W-FC:  $\beta = 0.110, p = 0.005$ ; F-WC:  $\beta = 0.115, p = 0.004$ ), and depression symptoms (W-FC:  $\beta = 0.071, p = 0.024$ ; F-WC:  $\beta = 0.094, p = 0.003$ ).

**TABLE 6** | The results of *post-hoc* analyses ( $n = 1,005$ ).

Variable		DASS-S		DASS-A		DASS-D		Happiness		W-FC		F-WC	
I	J	Mean difference (I-J)	<i>p</i>	Mean difference (I-J)	<i>P</i>	Mean difference (I-J)	<i>p</i>	Mean difference (I-J)	<i>p</i>	Mean difference (I-J)	<i>p</i>	Mean difference (I-J)	<i>p</i>
<b>Age</b>													
17–22 years old	23–28 years old	0.015	0.987	0.043	0.731	0.087	0.291	–0.070	0.656	–	–	–	–
	29–34 years old	0.240	0.091	0.236	0.067	0.347*	0.012	–0.406*	0.018	–	–	–	–
	35>	0.226	0.059	0.290*	0.003	0.484*	0.000	–0.488*	0.000	–	–	–	–
23–28 years old	17–22 years old	–0.015	0.987	–0.043	0.731	–0.087	0.291	–0.070	0.656	–	–	–	–
	29–34 years old	0.224	0.137	0.193	0.195	0.261	0.106	–0.406*	0.018	–	–	–	–
	35>	0.210	0.100	0.247*	0.021	0.398*	0.001	–0.488*	0.000	–	–	–	–
29–34 years old	17–22 years old	–0.240	0.091	–0.236	0.067	–0.347*	0.012	0.070	0.656	–	–	–	–
	23–28 years old	–0.224	0.137	–0.193	0.195	–0.261	0.106	–0.336	0.080	–	–	–	–
	35>	–0.014	1.000	0.054	0.970	0.137	0.775	–0.419*	0.004	–	–	–	–
35>	17–22 years old	–0.226	0.059	–0.290*	0.003	–0.484*	0.000	0.406*	0.018	–	–	–	–
	23–28 years old	–0.210	0.100	–0.247*	0.021	–0.398*	0.001	0.336	0.080	–	–	–	–
	29–34 years old	0.014	1.000	–0.054	0.970	–0.137	0.775	–0.083	0.966	–	–	–	–
<b>Location (region)</b>													
Central	Northern	0.238*	0.004	0.230*	0.003	0.253*	0.008	–0.330*	0.003	–	–	–	–
	East Coast	–0.019	1.000	–0.118	0.481	0.051	0.987	–0.150	0.634	–	–	–	–
	Southern	0.109	0.259	0.028	0.991	0.079	0.722	–0.205*	0.033	–	–	–	–
	East Malaysia	0.204	0.253	0.281*	0.017	0.307*	0.039	–0.359	0.056	–	–	–	–
	Outside	–0.380	0.277	–0.061	0.999	–0.249	0.812	–0.025	1.000	–	–	–	–
Northern	<b>Central</b>	<b>–0.238*</b>	0.004	–0.230*	0.003	–0.253*	0.008	0.330*	0.003	–	–	–	–
	<b>East Coast</b>	<b>–0.257*</b>	0.026	–0.348*	0.000	–0.201	0.256	0.180	0.608	–	–	–	–
	Southern	–0.130	0.374	–0.202*	0.015	–0.174	0.179	0.125	0.741	–	–	–	–
	East Malaysia	–0.035	0.999	0.051	0.995	0.055	0.997	–0.029	1.000	–	–	–	–
	Outside	–0.619*	0.011	–0.291	0.538	–0.502	0.142	0.305	0.829	–	–	–	–

(Continued)

TABLE 6 | Continued

Variable		DASS-S		DASS-A		DASS-D		Happiness		W-FC		F-WC	
I	J	Mean difference (I-J)	p	Mean difference (I-J)	P	Mean difference (I-J)	p	Mean difference (I-J)	p	Mean difference (I-J)	p	Mean difference (I-J)	p
East Coast	Central	0.019	1.000	0.118	0.481	-0.051	0.987	0.150	0.634	-	-	-	-
	Northern	0.257*	0.026	0.348*	0.000	0.201	0.256	-0.180	0.608	-	-	-	-
	Southern	0.128	0.485	0.147	0.248	0.028	0.999	-0.055	0.993	-	-	-	-
	East Malaysia	0.223	0.299	0.400*	0.001	0.256	0.263	-0.209	0.704	-	-	-	-
	Outside	-0.362	0.379	0.057	0.999	-0.301	0.698	0.125	0.996	-	-	-	-
Southern	Central	-0.109	0.259	-0.028	0.991	-0.079	0.722	0.205*	0.033	-	-	-	-
	Northern	0.130	0.374	0.202*	0.015	0.174	0.179	-0.125	0.741	-	-	-	-
	East Coast	-0.128	0.485	-0.147	0.248	-0.028	0.999	0.055	0.993	-	-	-	-
	East Malaysia	0.095	0.916	0.253	0.048	0.228	0.251	-0.154	0.838	-	-	-	-
	Outside	-0.489	0.071	-0.089	0.995	-0.328	0.571	0.180	0.977	-	-	-	-
East Malaysia	Central	-0.204	0.253	-0.281*	0.017	-0.307*	0.039	0.359	0.056	-	-	-	-
	Northern	0.035	0.999	-0.051	0.995	-0.055	0.997	0.029	1.000	-	-	-	-
	East Coast	-0.223	0.299	-0.400*	0.001	-0.256	0.263	0.209	0.704	-	-	-	-
	Southern	-0.095	0.916	-0.253*	0.048	-0.228	0.251	0.154	0.838	-	-	-	-
	Outside Malaysia	-0.584*	0.035	-0.343	0.422	-0.557	0.111	0.334	0.811	-	-	-	-
Outside country	Central	0.380	0.277	0.061	0.999	0.249	0.812	0.025	1.000	-	-	-	-
	Northern	0.619*	0.011	0.291	0.538	0.502	0.142	-0.305	0.829	-	-	-	-
	East Coast	0.362	0.379	-0.057	0.999	0.301	0.698	-0.125	0.996	-	-	-	-
	Southern	0.489	0.071	0.089	0.995	0.328	0.571	-0.180	0.977	-	-	-	-
	East Malaysia	0.584*	0.035	0.343	0.422	0.557	0.111	-0.334	0.811	-	-	-	-
<b>Risk of contagion</b>													
High risk	Moderate risk	-	-	-0.157*	0.031	-	-	-	-	-	-	-	-
	Low risk	-	-	0.047	0.848	-	-	-	-	-	-	-	-
Moderate risk	High risk	-	-	0.157*	0.031	-	-	-	-	-	-	-	-
	Low risk	-	-	0.204	0.109	-	-	-	-	-	-	-	-
Low risk	High risk	-	-	-0.047	0.848	-	-	-	-	-	-	-	-
	Moderate risk	-	-	-0.204	0.109	-	-	-	-	-	-	-	-

(Continued)



TABLE 6 | Continued

Variable	DASS-S			DASS-A			DASS-D			Happiness			W-FC			F-WC		
	J	M difference (I-J)	P	Mean difference (I-J)	P	Mean difference (I-J)	Mean difference (I-J)	P	Mean difference (I-J)	P	Mean difference (I-J)	P	Mean difference (I-J)	P	Mean difference (I-J)	P		
<b>Ethnicity</b>																		
Malay	Chinese	-	-	0.234*	0.000	-	-	-	-	-	0.131	0.511	-	0.095	-	0.759		
	Indian	-	-	0.211	0.105	-	-	-	-	0.462*	0.011	-	0.467*	0.011	0.011	0.011		
	Others	-	-	0.028	0.978	-	-	-	-	0.224	0.203	-	0.197	0.325	0.325	0.325		
Chinese	Malay	-	-	-0.234*	0.000	-	-	-	-	-0.131	0.511	-	-0.095	0.759	0.759	0.759		
	Indian	-	-	-0.023	0.997	-	-	-	-	0.330	0.207	-	0.372	0.134	0.134	0.134		
	Others	-	-	-0.205	0.084	-	-	-	-	0.093	0.909	-	0.102	0.889	0.889	0.889		
Indian	Malay	-	-	-0.211	0.105	-	-	-	-	-0.462*	0.011	-	-0.467*	0.011	0.011	0.011		
	Chinese	-	-	0.023	0.997	-	-	-	-	-0.330	0.207	-	-0.372	0.134	0.134	0.134		
	Others	-	-	-0.183	0.365	-	-	-	-	-0.237	0.554	-	-0.270	0.455	0.455	0.455		
Others	Malay	-	-	-0.028	0.978	-	-	-	-	-0.224	0.203	-	-0.197	0.325	0.325	0.325		
	Chinese	-	-	0.205	0.084	-	-	-	-	-0.093	0.909	-	-0.102	0.889	0.889	0.889		
	Indian	-	-	0.183	0.365	-	-	-	-	0.237	0.554	-	0.270	0.455	0.455	0.455		

\* Only significant result (p < 0.05) are presented. Variables with no significant result are not presented in this table or marked with "-".

## DISCUSSION

### Students' Levels of Negative Emotional Symptoms, Happiness, and Work-Family Conflict During the Period of COVID-19 Lockdown

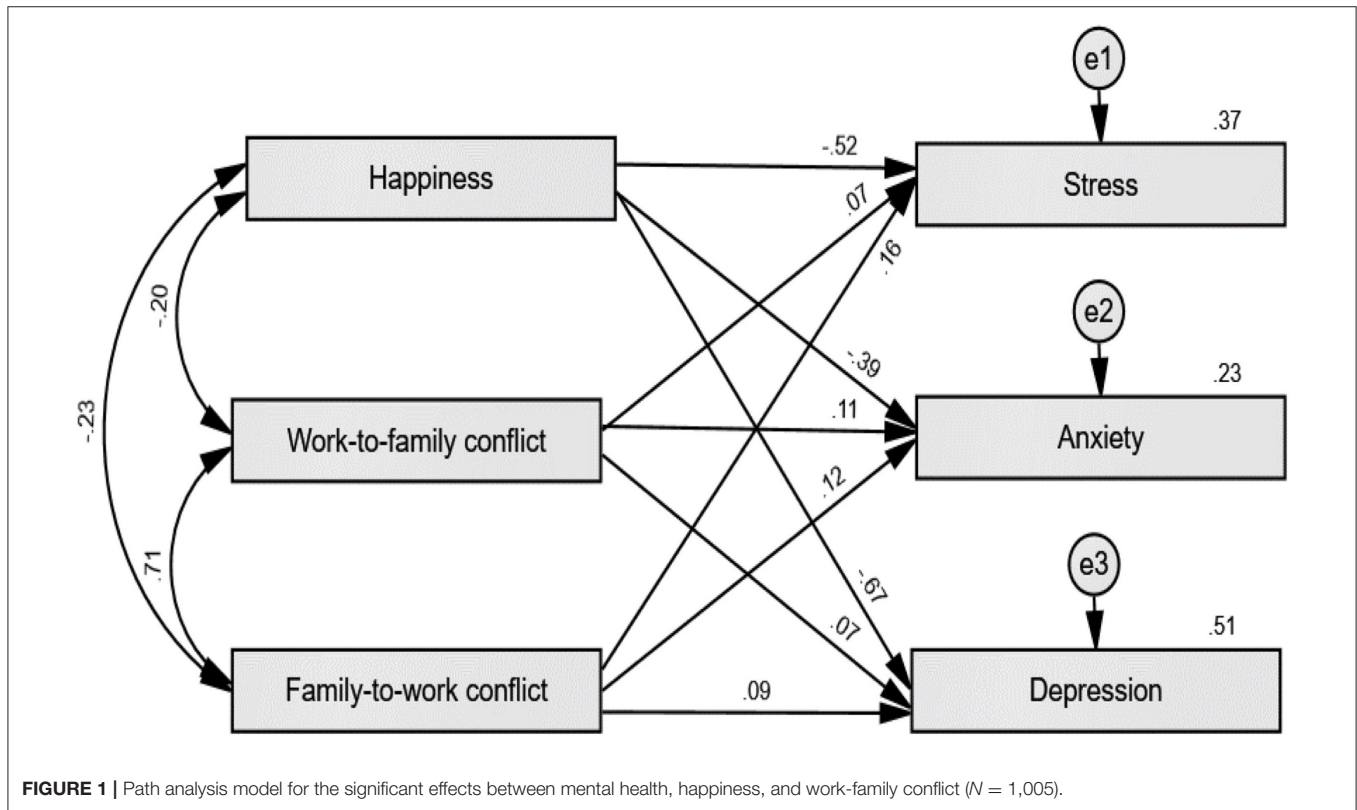
The implementation of the first MCO in Malaysia was generally found to be effective for curbing the spread of COVID-19; however, less is known on how it affected the psychological outcomes of university students. In terms of negative emotional symptoms, it appears that the majority of students experience normal level of stress symptoms. However, a major cause of concern was that nearly a quarter of students experience severe to extremely severe symptoms of anxiety and depression. Notably, nearly 40% of the students experience moderate to extremely severe symptoms of anxiety and depression. In comparison with a study conducted immediately after the COVID-19 outbreak in China, 16.5% reported moderate to severe depressive symptoms and 28.8% reported moderate to severe anxiety symptoms (24). Our findings to some extent are consistent with other studies that reported that outbreaks may trigger negative emotions either for COVID-19 (25) and SARS outbreaks (26, 27). This highlights the urgent need to cater to the mental health needs of the students to prevent further escalation without appropriate early interventions. Despite the alarming level of negative emotional symptoms, half of the students rated their happiness level as "rather happy" or "very happy." Our findings highlight further evidence that happiness can be maintained despite the fluctuating nature of our positive and negative mood (17).

This study also extends the understanding of students' state of work-family conflict during the period of MCO. Despite the lack of discussion on this notion among this population (11), our findings established compelling evidence that students are likewise experiencing interference of work and life conflict alike the working population. Work-family conflict refers to pressure from one area of life that negatively affects the other (19). An alarming rate of 50.4 and 39.2% of our total respondents were found to be experiencing high to very high levels of W-FC and F-WC which is significantly higher than average levels reported in the past research (11). This signifies that unconducive environment due to MCO carries certain negative implications to the students' everyday life. Having to stay at home with family members or to be confined in restricted university accommodations for a longer period may contribute to a different obstacle in their everyday life. Besides, the lack of resources and immense changes in terms of assessment might contribute to the conflict occurrences. Findings suggest that more students are experiencing higher work-to-family conflict compared with family-to-work conflict. In line with past research (11, 20), work behavior inflicts more damage to the family aspect, rather than the vice versa. Hence, engaging and spending time in academic-related activities such as online learning, assignment, and other related activities are perceived as a greater source of conflict during the MCO period.

**TABLE 7** | Predictors to severe stress (>25), anxiety (>14), and depression (>20) symptoms.

Variable	DASS-S		DASS-A		DASS-D	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
<b>Age</b>	1.056 (0.740, 1.508)	0.763	0.782 (0.598, 1.023)	0.072	0.959 (0.692, 1.328)	0.801
<b>Level of study</b>						
Diploma	0.577 (0.189, 1.757)	0.333	1.529 (0.792, 2.955)	0.207	1.826 (0.826, 4.038)	0.137
Master's degree	0.970 (0.362, 2.599)	0.952	0.642 (0.285, 1.447)	0.285	1.656 (0.700, 3.921)	0.251
Doctoral degree	0.594 (0.141, 2.504)	0.478	0.828 (0.290, 2.363)	0.724	0.280 (0.063, 1.239)	0.09
Others	1.010 (0.257, 3.968)	0.988	2.060 (0.807, 5.257)	0.131	0.747 (0.215, 2.603)	0.647
Bachelor's degree	Reference	1.00	Reference	1.00	Reference	1.00
<b>Risk of contagion</b>						
High risk	3.572 (0.759, 16.815)	0.107	0.962 (0.437, 2.120)	0.923	0.944 (0.362, 2.460)	0.906
Moderate risk	4.194 (0.807, 21.790)	0.088	1.922 (0.797, 4.632)	0.146	0.844 (0.248, 2.506)	0.760
Low risk	Reference	1.00	Reference	1.00	Reference	1.00
<b>Happiness</b>	0.240*** (0.180, 0.321)	0.000	0.336*** (0.273, 0.414)	0.000	0.121*** (0.088, 0.165)	0.000
<b>Work-family conflict</b>	1.183 (0.888, 1.577)	0.250	1.453*** (1.161, 1.818)	0.001	1.168 (0.894, 1.525)	0.254
<b>Family-work conflict</b>	1.468** (1.109, 1.943)	0.007	1.317* (1.059, 1.638)	0.013	1.172 (0.900, 1.527)	0.239

\*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001.



### Differences in Students' Level of Negative Emotional Symptoms, Happiness, and Work-Family Conflict Based on Demographic Factors

Further analysis indicated that the level of stress, anxiety, and depression were significantly different according to age

and geographic location. Younger students experienced more stress, anxiety, and depression symptoms compared with older ones. Research on the wider youth population conducted during the COVID-19 outbreak found younger college and school students reported higher levels of psychological distress compared with older students (8). Our study, however, does not record statistically significant different levels of symptoms

according to study level (i.e., diploma, degree, masters, etc.) with consideration that the proportion of undergraduate degree students far exceeded the others. Those in central locations were more depressed, while those in the east coast region were more stressed and anxious. While the risk of contagion varies within specific locations in the central region, it can be said that the central region in Malaysia is more densely populated compared with other regions with more number of positive COVID-19 cases reported in the central region.

There is also a significant difference and higher stress and anxiety symptoms among private university students compared with public university students. In general, most public universities in Malaysia are equipped with more comprehensive facilities in offering support to the students. Undeniably, attention to all students regardless of background is imperative, and our data highlights the need for more support for those in the private universities. Anxiety symptoms also differed according to the risk of contagion of the different locations. Unsurprisingly, much lower symptoms were recorded in low-risk regions or the “green zones.” However, slightly higher anxiety symptoms were recorded in moderate-risk regions compared with high-risk regions. A possible explanation for this is that the high-risk region may already be on red alert whereas moderate-risk regions may subdue its possible negative implications causing uncertainties. In essence, anxiety may also develop due to uncertainties of possible threats which compromises our ability to avoid or mitigate its negative implications (28).

Our data also shows that older students tend to be happier than younger students during the COVID-19 lockdown. Previous studies have reported that global happiness of university students follows an inverted parabola pattern in which happiness gradually increases as students aged but a sudden drop is observed with older students (29–31). It should be highlighted that nearly 90% of our respondents were between 17 and 28 years old that was consistent with the inverted parabola pattern. On the other hand, our findings show that the increment continues for older students despite the significantly underrepresented group of older students. Moreover, students’ happiness levels also varied based on location. Those in the central region recorded lowest happiness level, followed by those who are currently situated in the east coast and southern regions. These findings suggest that students located at the central region were least happy compared with the rest of the population, and these might be due to several plausible explanations. At times where this study was conducted, the central region was the most badly affected area due to COVID-19 with more than half of the subregions declared as “red” or high-risk zones. Dealing with very strict rules and such limited access to facilities might contribute to their slightly lower happiness level compared with the rest.

Meanwhile, there was a significant difference in terms of means level based on the type of university, location, and ethnicity for the experience of work-family conflict. Public university students, in particular, were found to record higher W-FC level compared with those from private universities.

Besides, the finding indicates that those in the east coast and southern region to report a higher level of W-FC compared with the rest. Malay ethnicity experienced higher W-FC levels compared with Indian and other ethnic groups. While it is difficult to provide a meaningful explanation to some of these findings, these patterns give some valuable insight on conflict experience based on demographic factors. It was argued that students who received greater support from the university and with higher satisfaction were likely to experience lower between domain conflict (32). This signals that gaps might exist between strategy and level of support implementation given by public and private university to students during the MCO period which may contribute to such differences. It highlights a pivotal point for policy makers or researchers to focus on a specific ethnic group, Malay which is found more vulnerable to experiencing higher between domains conflict.

### **Risk and Protective Factors of Students’ Level of Negative Emotional Symptoms During the Period of COVID-19 Lockdown**

Our findings indicated that students with higher levels of happiness have decreased probability to have severe or extremely severe symptoms of stress, anxiety, and depression. Such a finding was also aligned in the path analysis, whereby we found evidence on the negative linear relationship between happiness with the three mental health constructs. Likewise, a large-scale cross-sectional study on 2,383 university students in Korea whereby happiness is associated with lower risk of depression symptoms (33). For decades, the field of clinical psychology has primarily focused on problems and deficits. In recent years, however, positive factors of psychological well-being pioneered by Martin Seligman have been starting to receive wide attention among researchers (34). In essence, our findings build on the fact that while negative symptoms may precipitate negative emotional symptoms, positive aspects such as happiness can be a protective factor for negative emotional symptoms among university students. Importantly, our evidence establishes a strong link between low happiness level with higher depression level, which suggests the importance of improving student’s subjective experience as one of the focal points to improve their mental health. Consistent with this, the directional nature can be two ways as once highlighted by Richard Layard, the coeditor of the World Happiness Report; “Better treatment for mental health would improve happiness directly; and improving happiness in other ways would reduce the frequency of mental illness” (35).

On the negative note, this study identifies work-family conflict and family-work conflict as potential risk factors for developing severe or extremely severe anxiety and stress symptoms. This finding aligns with our path analysis result which suggested positive links between work-family conflict with stress, anxiety, and depression. In line with a previous study conducted in Minia, Upper Egypt, W-FC was associated with an increase in the probability of developing severe anxiety symptoms (36). Moreover, the likeliness of students developing severe stress

and anxiety is higher following the increasing score of F-WC. Following the concept of work-family conflict as a form of inter-role conflicts, this study provides support from the student's context that work-family and family-work conflicts may contribute to stress and anxiety. It also stresses the potential risk of students' everyday environment and their life integration practice during unprecedented times of COVID-19 as an area that needs serious attention. It is evident from past research that overall educational experience plays a great role in eliciting between domains conflict (32), henceforth monitoring such occurrence will reduce the risk of negative emotional symptoms among students' population.

## IMPLICATIONS AND RECOMMENDATIONS

In this section, implication and recommendation of this study will be emphasized by using the Strengths, Weaknesses, Opportunities, and Threats (SWOT) strategies.

### Strengths

Most institutions have their own vision planning and during this time, challenges should complement strategic planning based on current resources. Most universities do have facilities to manage financial structure, academic curriculum, and psychosocial support. Therefore, they need a strategic plan that can benefit all parties involved in universities. Enhance the role of psychosocial support not only among students but also their families and all university staff to ease the burden of public health care. Online psychological interventions such as mindfulness-based therapy and cognitive behavior therapy were found to be helpful during the COVID-19 pandemic (37). University management could offer structured support systems in the areas of academic, finance, and counseling (both career and psychological health). Hence, it is of prominent importance that universities establish guidelines for virtual services that include all systems such as counseling, lecture, enrolment, and industrial collaboration. If online counseling is to be implemented by universities, a proper guideline is also needed considering privacy, confidentiality, and professional ethics besides the emphasis on the accessibility and availability of technology for students from varied locations.

### Weaknesses

Clearly, enrolment of domestic and international students will be reduced and on-campus tuition will not begin until 2021 resulting to the financial structure being affected. University management, lecturers, and research supervisors should change old practice to suit new norms together to ease the needs of students. This aspect is essential not only to understand academic challenges but also work and family conflict that may be experienced by students while also recognizing the challenges they face such as work from home, children's challenges, and other factors. These two issues will continue to be part of weaknesses if people are not flexible in adjusting to changes that are deemed as necessary.

### Opportunities

Due to the above weaknesses, vision planning will coexist and complement strategic planning. For instance, private and small colleges and universities can collaborate with other institutions. The academic structure may combine the best of both direct and online learning approaches. The recruitment activities throughout the year will allow applicants more flexibility in the selection and enrolment of colleges and universities. New business models and financing options will bring stability to the "bottom line." All universities should be encouraged for cooperation rather than competition to ensure both parties (i.e., universities and ministries; students and family) can benefit behind this pandemic. Replace competition with collaboration between colleges, private universities, and governments that have had to postpone operations or even shut down due to declining enrolment and student income. Universities that have the potential to be financially viable can offer intellectual or material collation so that the impact of the virus is not to cease the operation of educational institutions but to revitalize and strengthen the education system forward.

In terms of offering psychosocial services and support such as assessment and intervention (counseling, psychology, and psychiatry), professionals in these fields need to not only double their efforts in the traditional practice locations but also facilitate the use of virtual technology beyond logistics restrictions to provide appropriate services to students irrespective of their physical locations. This is even more imperative considering the high number of referral cases received by the public health services for the assessment and interventions of psychological issues in Malaysia (38). Programs utilizing psychologically positive methods can also be implemented for those affected by this COVID-19 pandemic to enhance aspects of happiness, gratitude, and emotional regulation. For students with diagnosis of mental illness or even with early signs of disorders, serious attention should be given so that the consequence will not worsen.

### Threats

COVID-19 pandemic accelerates the end of the traditional semester-based system for college enrolment, progress, and graduation. Some colleges and universities may be forced to close down. If the academic year is restructured, then the recruitment year must be restructured. An effective method of communication is important to ensure future students, graduates, and their parents are well-informed about any changes to be made. New business models and financing options shall be introduced to encourage students to continue their education without adding more burden to their families. The amount of annual/semester fees and other required fees should be reconsidered by the universities accordingly. Economic vulnerabilities may be one of the reasons for students' reluctance to seek help if they experience COVID-19 symptoms. These imply a need for involving the university clinics and health services as local health gatekeepers who are the first point of detecting and reporting of suspected COVID-19 cases (39), as well as a channel where accurate information regarding COVID-19, protective equipment, and intervention packages



can be delivered (40). Having COVID-19 testing centers in the universities are also recommended (39).

In sum, the psychological impact of the COVID-19 pandemic allows fresh opportunities for all parties to improve current financial management weaknesses, advance higher education curricula, enhance online learning opportunities, and most importantly improve communication between students, families, and universities to collaborate for the sake of good mental health and future prospect.

## LIMITATIONS AND FUTURE RESEARCH

This study has several limitations. In view of the MCO restrictions, we employed the non-probability snowball sampling method, therefore the findings do not reflect the overall patterns of negative emotional symptoms, happiness, and work-life balance and are not generalizable to the wide university student population in Malaysia. Moreover, our study also did not investigate possible confounders such as electronic device availability, Internet accessibility, premorbid personality, and coping style that could have an influence toward the study results. In addition, since this study was conducted during specific MCO period, thus findings are subjected to the unique circumstance of when this study took place. It cannot however be used to understand post-MCO period behavior. Therefore, future researchers might want to conduct studies investigating

fluctuation in terms of emotional and behavioral symptoms between the lockdown transition periods.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Faculty of Arts and Social Sciences, University of Nottingham Malaysia Campus ethics committee (Approval number: FASS2020-0008/DOAP/SKH). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

WMAWMY and SKZB contributed to the conception of the study, contributed significantly to analysis, manuscript preparation, performed the data analyses, and wrote the manuscript draft. SAP and FM helped modify the manuscript. WMAWMY, SKZB, SAP, and FM contributed to the interpretation and discussion of the results of the analysis. All authors contributed to the article and approved the submitted version.

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# Comparative Effectiveness of Multiple Psychological Interventions for Psychological Crisis in People Affected by Coronavirus Disease 2019: A Bayesian Network Meta-Analysis

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**Objective:** The objective of our current research is to compare the different psychological interventions and distinguish the most effective way to treat psychological crisis according to different clinical manifestations in people affected by coronavirus disease 2019 (COVID-19). No previous systematic review has provided a comprehensive overview by performing a Bayesian network meta-analysis of this current topic.

**Method:** A systematic review and a Bayesian network meta-analysis were conducted on randomized controlled trials (RCTs), non-RCTs, case-control studies, self-controlled case series (SCCS), cohort studies, and cross-sectional studies of all the available interventions for psychological crisis in people affected by COVID-19. We searched the electronic databases EMBASE, PubMed, Web of Science, PsycINFO, and Cochrane Library, as well as the Chinese databases such as Sinomed, Chinese Biomedicine Literature (CBM), Chinese Scientific Journal Database (VIP), WanFang Database, and China National Knowledge Infrastructure (CNKI), from 2019 to April 30, 2020. The main outcomes were self-rating anxiety scale (SAS), self-rating depression scale (SDS), patient health questionnaire (PHQ-9), and symptom checklist (SCL-90). The study is registered with Inplasy, number 202050076.

**Result:** Sixteen self-controlled case series (SCCS) comprising 1,147 participants compared five different psychological interventions with four different measurement scales were included in this study. For effectiveness, all the psychological therapies were significantly more effective than before intervention. Our results showed that supportive therapy (ST), which is adjusted to the COVID-19-related mental crisis, is the best treatment compared with behavioral therapy (BT), nursing-based psychological

therapy (NBPT), traditional Chinese medicine therapy (TCMT), and COVID-19-related standard training (CRST) at reducing the anxiety-related symptoms assessed by SAS. When measured by SDS, BT was better than ST and NBPT treatment for reducing the depression symptoms. And ST was better than BT and ST+BT as assessed by PHQ-9. In the end, the last network meta-analysis indicated that NBPT was more effective than ST by the measurement of SCL-90.

**Conclusion:** Our research suggested the potential effectiveness of psychological interventions for decreasing psychological crisis in people affected by COVID-19 and try to introduce the best effective treatment options for clinical practice according to the clinical manifestations of psychological problems, but further confirmation from high-quality RCTs is needed.

**Keywords:** psychological intervention, COVID-19, affected people, psychological crisis, network meta-analysis

## INTRODUCTION

The acute respiratory infectious disease caused by the outbreak of coronavirus disease 2019 (COVID-19) spread quickly to all parts of the world. The World Health Organization (WHO) points out that the COVID-19 is an international public health emergency with the highest mortality rate among the new-onset infectious diseases (Sohrabi et al., 2020). The outbreak occurred during the Chinese New Year. The high mobility of the population is very conducive to the spread of the virus, resulting in a rapid increase in the number of affected people, which poses a great threat to human health, resulting in extremely tight medical resources and immense psychological pressure on both medical staff and patients (Blake et al., 2020; Talevi et al., 2020).

Due to the impact of the epidemic, many changes have taken place in people's daily lives. Life seems to be filled with information related to the epidemic. There has also been a panic reaction of irrationally hoarding food, snapping up masks, and disinfecting supplies. Many studies have found that COVID-19 patients and medical staff are more prone to mental disorders than the general population, such as feeling uneasy, worried, fear, confused, and helpless; insomnia; depression; and other psychological crises (Petzold et al., 2020; Wu and Zhang, 2020).

Psychological intervention is aimed to reduce the risk of acute psychological crisis and stabilize or reduce the direct and serious consequences of psychological crisis on the individual, thereby promoting the individuals to recover from the crisis. After the outbreak, whether or not to take correct measures in a timely manner is an important factor in rehabilitation. We believe that actively carrying out mental health work on such people can reduce the potential and long-term impact on the mind.

At present, Internet information is convenient and well-developed; various stress manuals, methods of psychological intervention (including professional intervention and self-intervention), video, audio, and WeChat articles are overwhelming. Information overload makes many effective psychological intervention methods submerged in a large amount of information. And which psychological intervention is better is still controversial. Therefore, finding effective psychological intervention is particularly important. Based on this, the Bayesian method is used here to analyze the

therapeutic effects of different psychological interventions and to explore the best psychological intervention methods under the COVID-19 epidemic.

We compared five different psychological interventions in this research. First, supportive therapy (ST) is a commonly used and well-developed psychological intervention with a long history, and the studies we included in this article were adjusted according to the particularity of the COVID-19 epidemic. Second, BT is another commonly used non-pharmacological application defined as behavior-change intervention, including exercise or changes in daily activity to help deal with the psychological problems. Third, traditional Chinese medicine therapy (TCMT) is a psychological adjustment method based on traditional Chinese medicine theory and modern psychology, such as acupoint-plucking emotional freedom method (Tian, 2014). Next, COVID-19-related standard training (CRST) refers to the training of medical expertise in the guidelines related to the COVID-19, as well as learning to deal with psychological crisis caused by COVID-19. The last one, nursing-based psychological therapy (NBPT), is a unified nursing process with characteristics formulated according to the COVID-19 treatment plan, including breath training and psychological evaluation and guidance. We hope to provide scientific and effective psychological intervention methods for maintaining the mental health of people affected by COVID-19.

## METHODS

We conducted this study according to the Cochrane Handbook for the Systematic Review of Interventions (see details at <http://training.cochrane.org/handbook>), and reporting was in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension statement for network meta-analyses (Liberati et al., 2009). Included studies were classified according to the types of psychological interventions.

## Search Strategy

We searched the electronic databases EMBASE, PubMed, Web of Science, PsycINFO, and Cochrane Library, as well as Chinese databases such as Sinomed, Chinese Biomedicine Literature



(CBM), Chinese Scientific Journal Database (VIP), WanFang Database, and China National Knowledge Infrastructure (CNKI), from 2019 to April 30, 2020. Searches were not restricted by language. We aimed to compare all psychological interventions used for psychological crisis in people affected by COVID-19 (see **Supplementary Figure 1** for full search terms).

## Study Selection

### Participants

Psychological crisis was assessed in people affected by COVID-19, which includes confirmed patients, patients with suspected infection, quarantined relatives, and other patients who have a high risk of infection due to other diseases that have to be treated in the hospital, as well as caregivers and health-care professionals, such as doctors, nurses, and health-related administrators.

### Interventions

All types of psychological interventions were included as long as the explicit aim was to prevent anxiety, depression, and fear of any other type of psychological crisis.

### Comparisons

Any type of psychological treatments was compared with each other or with other control groups (placebo, blank, and usual care) who were eligible.

### Outcomes

At least one outcome reported psychological symptoms. The primary outcomes were self-rating anxiety scale (SAS), self-rating depression scale (SDS), patient health questionnaire (PHQ-9), and the symptom checklist (SCL-90), which were also analyzed by a network meta-analysis.

### Study Design

Randomized controlled trials (RCTs), non-RCTs, case-control studies, self-controlled case series (SCCS), cohort studies, and cross-sectional studies were all included.

### Exclusion Criteria

(1) The same patients were enrolled in different articles; (2) duplicate reports, conferences, observational studies (prospective and retrospective), review articles, nonhuman studies, studies with incorrect comparator, and case reports were strictly excluded.

## Data Extraction and Quality Assessment

Two investigators (YY and SWH) independently selected the studies. The extractions of the relevant information from the included trials were extracted with a predetermined data extraction sheet (**Table 1**). The risk of bias assessments was performed at the outcome measure level during data collection. And different types of tool were used according to the different study designs. Any disagreements were resolved through discussion. When they could not reach a consensus, the final decision regarding each question was made by other investigators (HBL) within the review team.

## Statistical Analysis

First, we summarized and analyzed the baseline data and outcomes of involved studies' characteristics. Accordingly, mean differences (MDs) for continuous outcomes with 95% credible intervals (CrIs) were selected to reflect the assessments.

We conducted two types of meta-analyses. First, we conducted traditional pairwise meta-analyses using a random-effects model, through which the heterogeneities and publication biases among the trials were well anticipated before the Bayesian network meta-analysis. The analysis above evaluated the heterogeneities by the  $I^2$  statistic and judged the publication biases using funnel plots, and all the processes were performed in RevMan version 5.3.

A Bayesian network meta-analysis was conducted by using Aggregate Data Drug Information System (ADDIS, version 1.16.8). This software is based on the Bayesian framework and the Markov chain Monte Carlo method, which can evaluate *a priori* and process research data. The  $I^2$  statistic will be used to assess levels of the heterogeneity. Fixed-effects models will be used if the  $I^2$  value is 0.05, indicating good consistency. Iteration number will be set to 50,000; and the first 10,000 iterations for annealing will be set up to eliminate influences of the initial value. For indirect comparison, continuous outcomes will be calculated as standardized mean differences (SMDs), and binary outcomes will be calculated as ORs. Both types of effect sizes will be presented with 95% CrIs, and values of  $p < 0.05$  will be regarded as statistically significant. The analysis of the network plot will show the evidence supporting the relationship between the included studies. Also, the result figures and network meta-analysis graphs will be provided.

## RESULTS

### Study Identification and Selection

In total, 6,194 citations published between 2019 and April 30, 2020, were identified by the search. **Figure 1** shows the process of study selection. Eventually, 16 unique researches involving 1,147 unique patients were eligible for further analyses. The baseline characteristics of the studies were also extracted (**Table 1**).

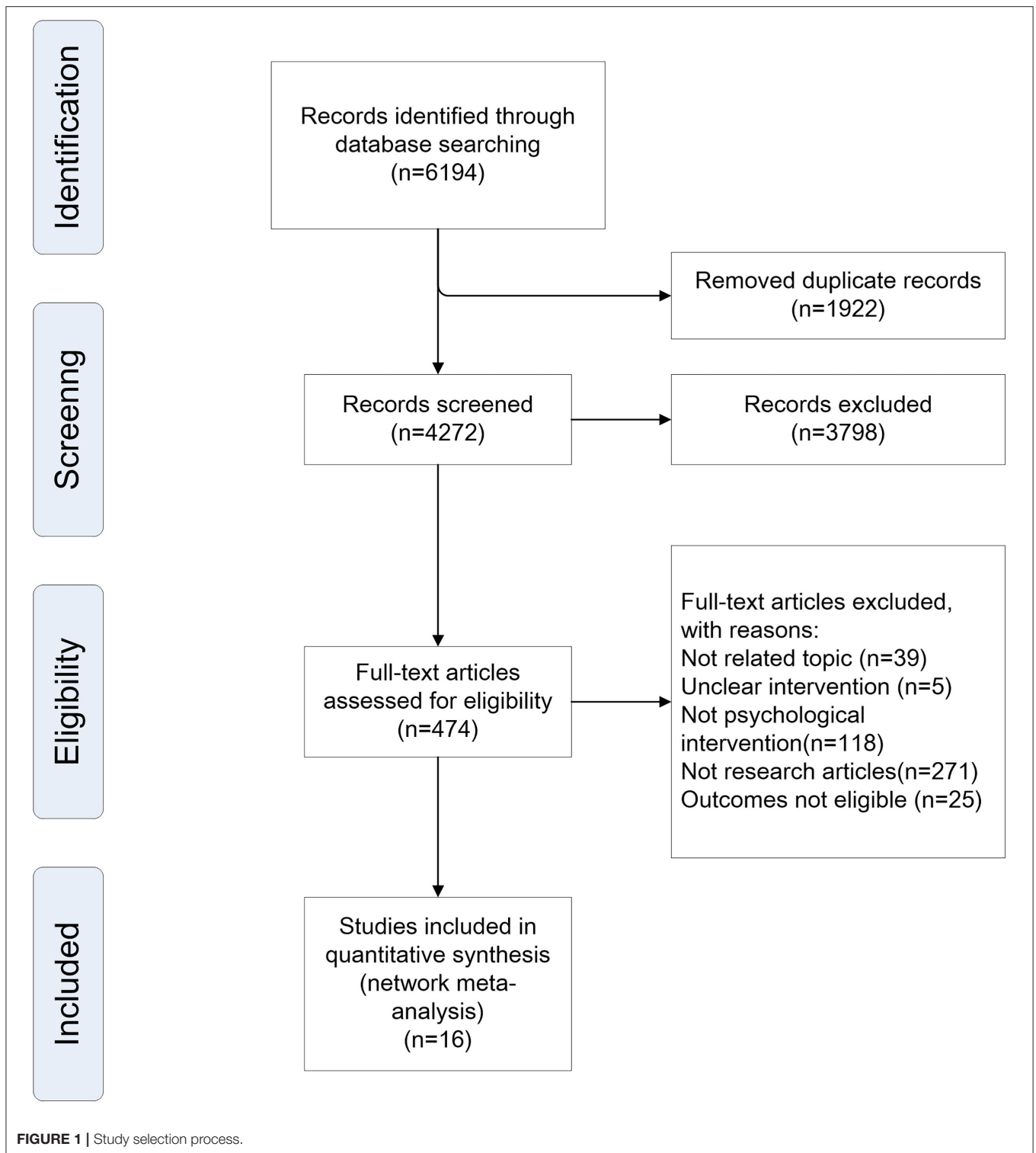
### Quality Assessment of Included Studies

Due to the particularity of COVID-19, it is difficult to conduct RCT research as far. After final screening, all the experiments included in this systematic review are SCCS (nonrandomized) without any RCTs. So we utilized the Newcastle-Ottawa scale (NOS) with a slightly adapted version to match the needs of this study to evaluate the quality of SCCS studies ([http://www.ohri.ca/programs/clinical\\_epidemiology/oxford.asp](http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp)). The quality of the studies was evaluated by examining three items: patient selection, comparability of groups, and assessment of outcome. Studies were graded on an ordinal star scoring scale, with higher scores representing studies of higher quality. A study can be awarded a maximum of one star for each numbered item within the selection and exposure categories, and a maximum of two stars can be given for the comparability. The quality of each study was

**TABLE 1** | Baseline of included studies.

Year	First author	Location	Participants	Mean age in years	Sex	Intervention	Main outcomes	Final sample size	Duration
2020	Man-Ping Zeng (Zeng et al., 2020)	Hunan, China	Nurse	29 ± 3	M/F 5/37	TCMT	SAS	37	10 days
2020	Xiao-Ping Huang (Huang and Ke, 2020)	Guangdong, China	Hospital disinfection supply center staff	38.28 ± 11.9	M/F 18/32	CRST	SAS	50	1 week
2020	Wei Mi (Mi and Yu, 2020)	Anhui, China	Confirmed patients	39.05 ± 13.22	M/F 10/10	NBPT	SAS	20	2 weeks
2020	Xue-Ying Li (Li and Tang, 2020)	Hubei, China	Confirmed patients	No mention	M/F 23/21	NBPT	SAS, SDS	48	5 days
2020	Hong Chen (Chen et al., 2020)	Hubei, China	Confirmed patients	51.55 ± 18.36	M/F 39/36	BT	SF-36, SAS, SDS	75	From admission to discharge
2020	Xia Xu (Xu, 2020)	Hubei, China	Confirmed patients	No mention	No mention	BT	PHQ-9	208	1 week
2020	Ying Ren (Ren et al., 2020)	Henan, China	Doctor	No mention	M/F 15/39	ST	SCL-90	54	1 week
2020	Xia Li (Li et al., 2020)	Hubei, China	Nurse	30.32 ± 5.39	M/F 13/108	ST	GAD-7, PHQ-9, PSQI	121	1 week
2020	Chun-Yan Kuang (Kuang et al., 2020)	Guangdong, China	Confirmed patients	35.2 ± 9.66	M/F 32/36	ST	SAS, SDS	68	2 weeks
2020	Li-Min Xing (Xing et al., 2020)	Hubei, China	Nurse	31.37 ± 7.26	M/F 2/38	NBPT	SCL-90	40	2 weeks
2020	Yan-Li Yang (Yang et al., 2020)	Guangdong, China	Other inpatient	51.2 ± 4.3	M/F 32/18	NBPT	SAS	50	1 week
2020	Cui Tian (Tian et al., 2020)	Beijing, China	Nurse	26.75 ± 3.67	M/F 3/57	ST+BT	GAD-7, PHQ-9, PSQI	60	1 week
2020	Yan-Qiao Bao (Bao et al., 2020)	Hubei, China	Nurse	No mention	M/F 11/34	NBPT	SCL-90	45	2 weeks
2020	Yan-Wen Dong (Dong, 2020)	Hubei, China	Health-related administrators	25–55	M/F 19/37	ST	SAS, SDS	56	No mention
2020	Xuan Zhou (Zhou et al., 2020)	Zhejiang, China	Nurse	33.27 ± 7.43	M/F 10/195	ST	SAS, SDS	205	1 week
2020	Yang Zhang (Zhang et al., 2020)	Zhejiang, China	Confirmed patients	44.9 ± 19.2	M/F 5/5	ST	SAS, SDS	10	1 time

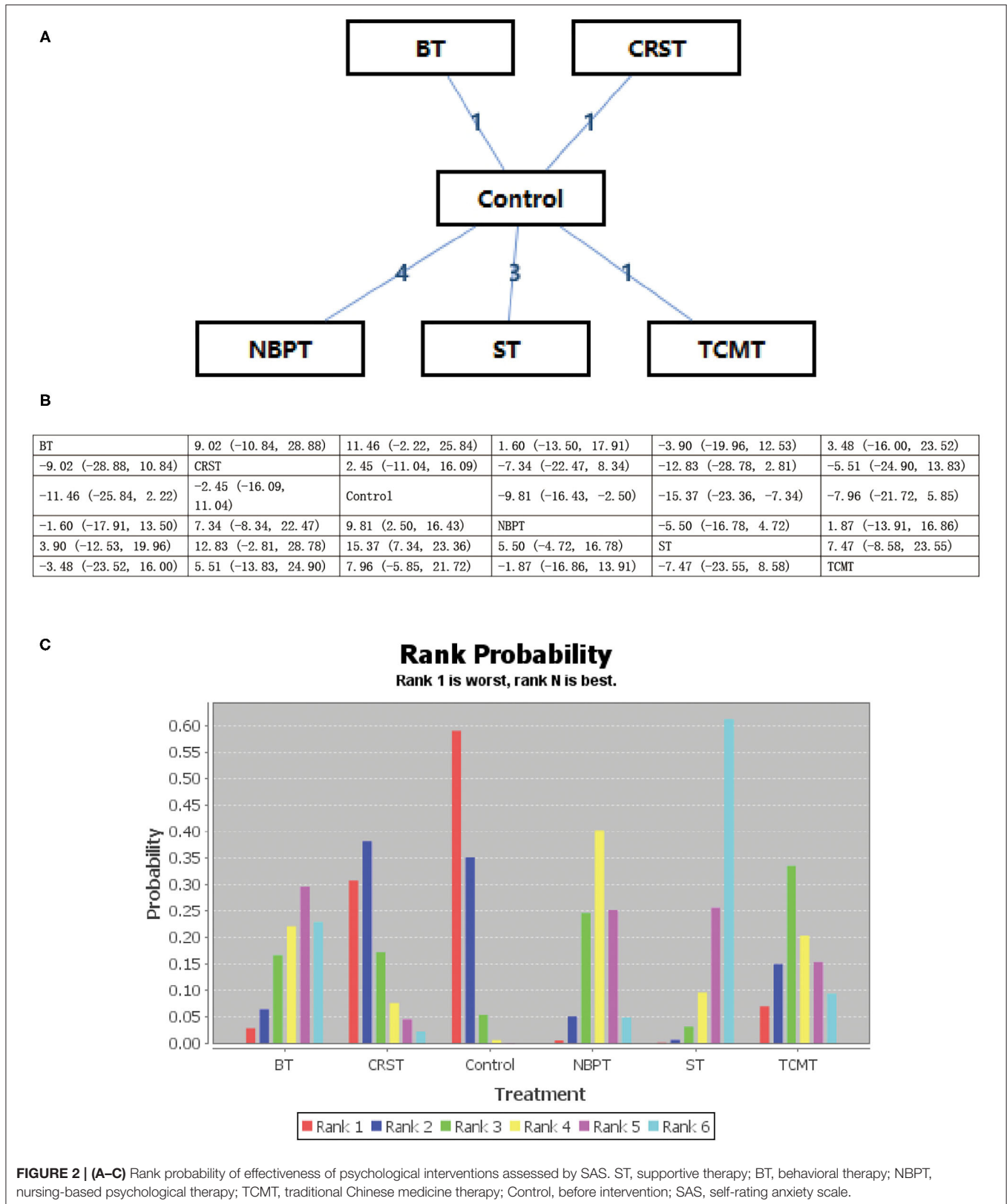
TCMT, traditional Chinese medicine therapy; SAS, self-rating anxiety scale; CRST, coronavirus disease 2019-related standard training; NBPT, nursing-based psychological therapy; SDS, self-rating depression scale; BT, behavioral therapy; SF-36, 36-Item Short Form Health Survey; PHQ-9, patient health questionnaire; ST, supportive therapy; SCL-90, symptom checklist; GAD-7, General Anxiety Disorder-7; PSQI, Pittsburgh Sleep Quality Index.



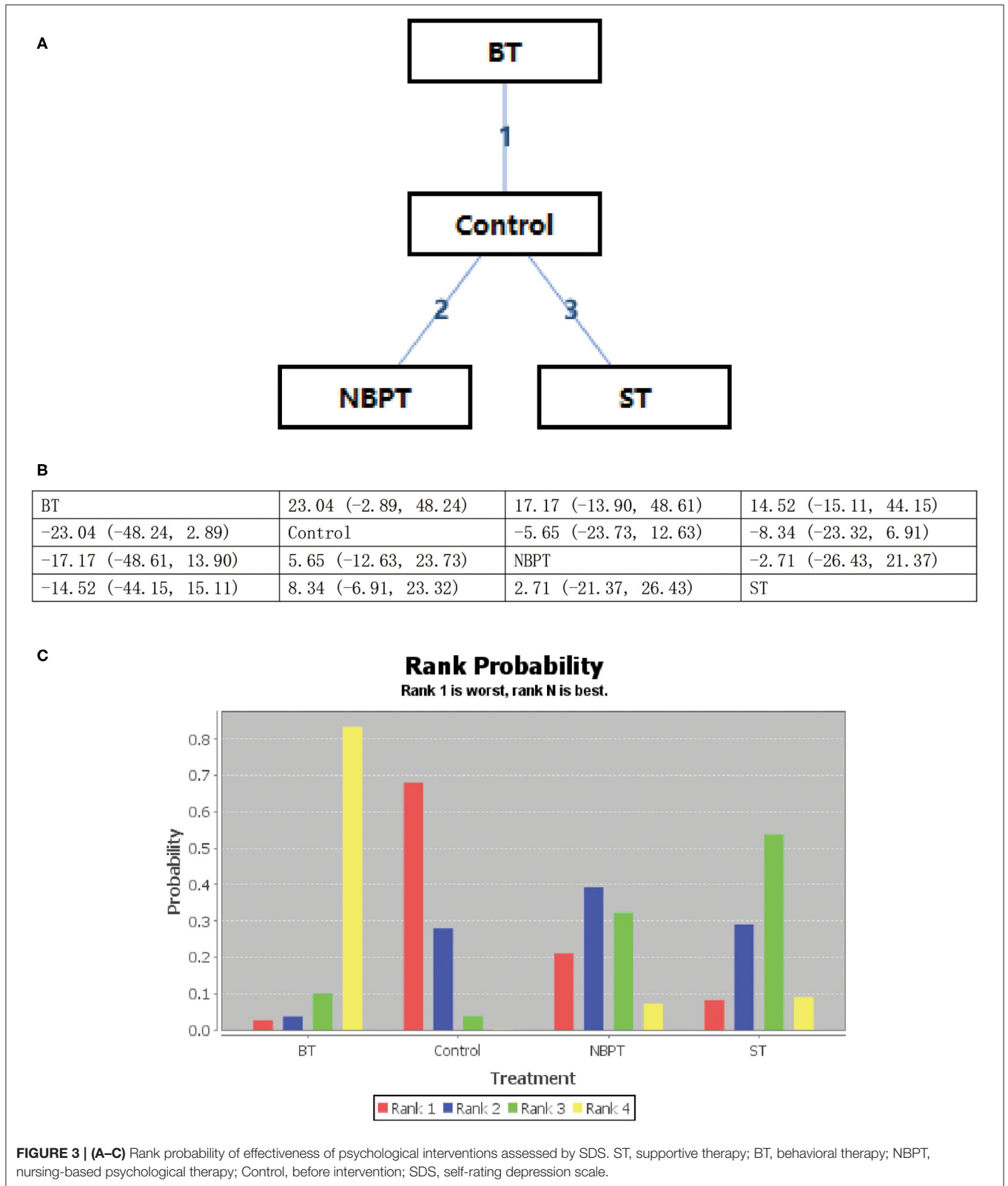
graded as either low quality (0–5) or high quality (6–9). The bias introduced in the studies included in this research was mainly attributed to the lack of community controls. The results of the risk of bias assessments for the SCCS studies are presented in **Supplementary Figure 2**.

### Meta-Analyses

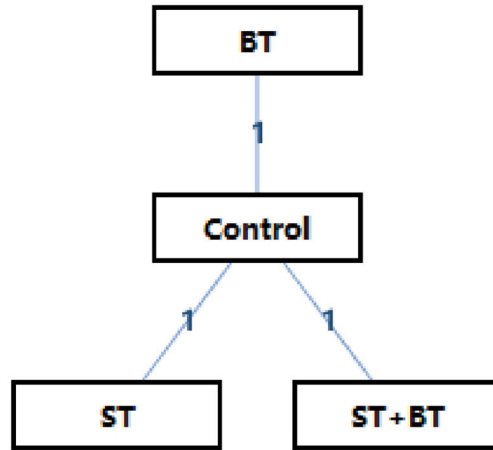
There were a total of four network meta-analyses performed to compare and rank the included psychological interventions in four different psychological scales. The network of eligible comparisons for effectiveness







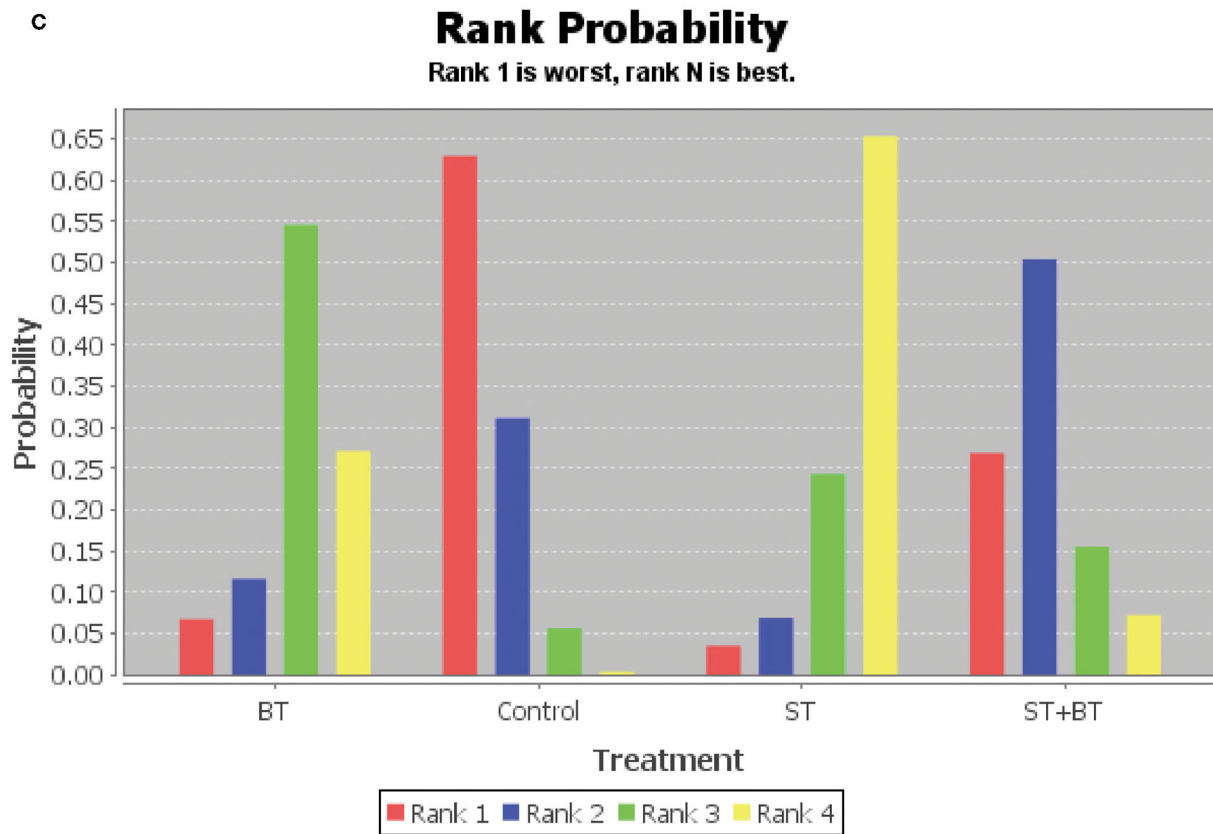
**A**



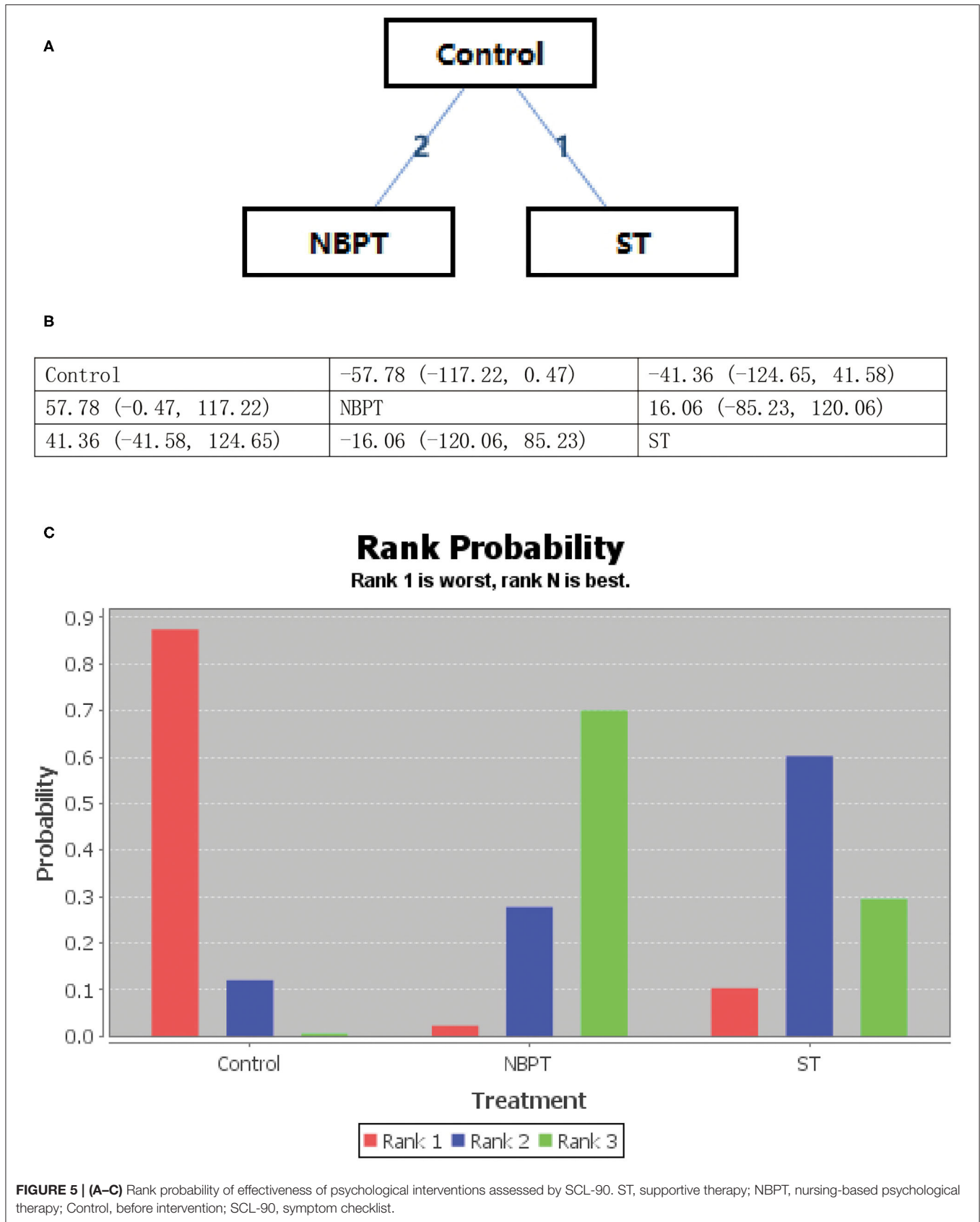
**B**

BT	5.03 (-3.74, 13.24)	-1.81 (-13.87, 10.50)	3.58 (-8.58, 16.12)
-5.03 (-13.24, 3.74)	Control	-6.85 (-15.29, 1.93)	-1.44 (-9.94, 7.27)
1.81 (-10.50, 13.87)	6.85 (-1.93, 15.29)	ST	5.40 (-6.95, 17.42)
-3.58 (-16.12, 8.58)	1.44 (-7.27, 9.94)	-5.40 (-17.42, 6.95)	ST+BT

**C**



**FIGURE 4 | (A–C)** Rank probability of effectiveness of psychological interventions assessed by PHQ-9. ST, supportive therapy; BT, behavioral therapy; ST+BT, combination of supportive therapy and behavioral therapy; Control, before intervention; PHQ-9, patient health questionnaire.



consisted of 16 studies and 5 treatments. The consistency model was selected for the subsequent network analyses. Meanwhile, the inconsistency model was used to test consistency.

All psychological interventions were more beneficial than the control condition, but the best interventions on different scales are not completely consistent; also the rankings are also inconsistent. The results of our study indicated that ST was significantly more effective than the other treatments for reducing anxiety symptoms in SAS. Then the ranking is BT, NBPT, TCMT, and CRST. The ranking probability of treatments is presented in **Figure 2**. The second network meta-analysis was run to assess the most effective psychological interventions in SDS. We can see that BT was the best, followed by ST and NBPT. The specific network is presented in **Figure 3**. In terms of effectiveness in PHQ-9, group ST (SMD, 1.81; 95%CI 10.50, 13.87) were more effective than group BT. But interestingly, group ST+BT was the least effective one. The specific network is presented in **Figure 4**. In the final network meta-analysis, which was conducted to assess the effectiveness in SCL-90, only two kinds of psychological interventions (NBPT and ST) were included. They were both significantly more effective than before the intervention. And NBPT showed significantly more benefit than ST condition (SMD, 16.60; 95%CI, -85.23, 120.06) (**Figure 5**). **Supplementary Figure 3** shows the results of pair-wise meta-analyses of compliance for each intervention.

## DISCUSSION

This network meta-analysis included all available studies from 2019 to April 30, 2020, to analyze the effectiveness of psychological interventions for psychological crisis in people affected by COVID-19. After careful screening, a total of 16 articles were included in the study. Because of the rapid development of the epidemic, there are few published RCTs. Although all the studies were case studies and data of randomized controlled studies were lacking, most of our results had relatively high quality in terms of the NOS, and there was no obvious publication bias.

We can see that, in this study, the ranking of various interventions in different psychological scales was inconsistent, which indicated that different interventions may have different therapeutic effects on psychological problems. The ranking probability was primarily tied to direct and indirect effects that might provide robust evidence to support the results. Therefore, most of our conclusions were based on the ranking probability. But what can be found is that these interventions can effectively reduce the psychological crisis compared with before the intervention. First, there were five kinds of psychotherapies (ST, BT, NBPT, TCMT, and CRST) included in this network analysis that was assessed by SAS. Among them, ST showed a better effectiveness in the management of anxiety symptoms. ST is a commonly used and well-developed psychological intervention with a long history. The experiments we included in the study that used ST as a treatment were adjusted

according to the particularity of the epidemic. They also showed significance in improving mental health assessed by PHQ-9 when compared with BT, or even the combination of ST and BT. However, these results may have been related to sample size. Then, based on our results, we found out that the most effective intervention for psychological crisis especially the depression symptoms according to the SDS test was BT, which is another commonly used non-pharmacological application defined as behavior-change intervention, including exercise or changes in daily activity to help deal with the psychological problems. And ST and NBPT were the second and third in reducing depression feelings as assessed by SDS. The last network meta-analysis only included two kinds of psychological interventions (NBPT and ST). And we found that NBPT was better than ST when measured by SCL-90. We did not standardize different measurement scales when conducting this network analysis, because each evaluation tool has special characteristics and focuses on different clinical manifestations of psychological problems. Therefore, it may be valuable to distinguish the clinical manifestations of psychological problems and adopt the best effective treatment options accordingly.

Due to the lack of understanding of COVID-19 in the first place, it is difficult to form a complete routine work process in a short period of time. Inadequate medical resources, insufficient medical protection and treatment measures, and the high infectivity of the virus have led to a sharp increase in the number of patients and a high mortality rate. As a result, the frontline medical staff and COVID-19 patients are suffering from psychological crisis to varying degrees (Huang and Zhao, 2020). It is easy to feel helpless and insecure and even to experience psychological problems such as anxiety, insomnia, fear, panic, blind disinfection, disappointment, irritability, aggressive behavior, and blind optimism (Duan and Zhu, 2020). Therefore, timely and effective psychological interventions can play a positive role in protecting the patients' physical and mental health (O'Donoghue et al., 2020). However, which intervention can better treat the psychological crisis has not been studied. Therefore, the results of this article are very meaningful.

## CONCLUSIONS

This research first evaluated the effectiveness of multiple psychological interventions for psychological crisis in people affected by COVID-19 *via* a Bayesian network meta-analysis and suggested potential benefit of psychological interventions for mental disorders caused by COVID-19 among all the affected people. Comprehensive analysis of the results indicated that ST was the most commonly used therapy and showed a better performance in all the measurement scales, with SAS and PHQ-9 in the first place and SCL-90 and SDS in the second. According to different assessment outcomes, ST, BT, and NBPT might be recommended for the COVID-19-affected people as their first-line treatment for managing psychological crisis. However, due to the limitations of case series studies, there is still a need for



a larger sample size, especially high-quality RCTs and advanced analytic strategies in the future to confirm such conclusions.

## Strengths and Limitations

First, this is the first Bayesian network meta-analysis that comprehensively summarized all available evidences on the effectiveness of different psychological interventions in the treatment of psychological crisis during the COVID-19 pandemic. Second, it objectively recommended the best effective treatment options according to the clinical manifestations of psychological problems for people affected by COVID-19.

However, there were still some limitations included in this study: (1) all the included studies were case series. However, due to the rapid popularity of COVID-19, RCT or prospective studies have not been possible so far. (2) Although the language restriction was set as English and Chinese, we failed to include qualified English literature. However, as far as we know, there have been no reports of ethnic differences in the pathogenesis of COVID-19 so far. (3) We did not conduct subgroup analysis. (4) Due to the non-closed loop and few publications, the effectiveness of certain interventions may be exaggerated. (5) The ADDIS software is simple and convenient to operate, but it cannot be freely programmed, which may have some limits.

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## AUTHOR CONTRIBUTIONS

YY conceived the research and wrote the original draft. SS and SH were responsible for data selection and statistical analysis. CT participated in the search strategy development. YZ did a lot of work on the revision and finalization of the paper. HL participated in the design of data synthesis and to call the final determination when there still existed controversy after discussion. All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.577187/full#supplementary-material>

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# In the Eye of the Covid-19 Storm: A Web-Based Survey of Psychological Distress Among People Living in Lombardy

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In March 2020, the World Health Organization announced the Covid-19 outbreak a pandemic and restrictive measures were enacted by the Governments to fight the spread of the virus. In Italy, these measures included a nationwide lockdown, with limited exceptions including grocery shopping, certain work activities, and healthcare. Consistently with findings from previous studies investigating the psychological impact of similar pandemics [e.g., Severe Acute Respiratory Syndrome (SARS)], there is evidence that Covid-19 is associated with negative mental health outcomes. Given this background, we conducted a cross-sectional study aimed at investigating the impact of the Covid-19 pandemic and the subsequent restrictive measures imposed by the Government on the psychological health of Italian men and women aged =18 years and living in Lombardy, one of the worst-hit regions. The study also aimed at identifying what factors are associated with specific psychological outcomes. Thus, we developed an online survey that included a researcher-made questionnaire to collect sociodemographic, household, general health, and pandemic-related information. The Generalized Anxiety Disorder-7, the Patient Health Questionnaire-9 and the Perceived Stress Scale were used to assess anxiety, depression, and perceived stress, respectively. We found that younger age, greater concerns about the pandemic, female gender, being unmarried, not having children, and being a student were associated with worse psychological health. These findings may provide further insight into the risk factors associated with negative psychological outcomes during the current pandemic, with identification of vulnerable groups. This body of evidence may help professionals implement targeted psychosocial treatment and prevention programs.

**Keywords:** COVID-19, anxiety, depression, perceived stress, online survey, Lombardy (Italy)

## INTRODUCTION

Since December 2019, when the first cases were reported in the city of Wuhan, China, the Covid-19 outbreak has spread worldwide, facilitated by the contagiousness of asymptomatic individuals, as well as by international travels (Matias et al., 2020; Vigo et al., 2020). In the morning of 12 March 2020, with more than 20,000 confirmed cases and almost 1,000 deaths in Europe, the World Health Organization (WHO) announced the Covid-19 outbreak a

pandemic<sup>1</sup>. Different types of restrictive measures were enacted by the Governments to contain the spread of the disease. In Italy, these measures involved a nationwide lockdown from 9 March to 4 May 2020, with exceptions allowed only for medical reasons and for necessities like grocery shopping and work.

The negative psychological impact of similar pandemics [such as Severe Acute Respiratory Syndrome (SARS), Ebola, the 2009–2010 H1N1 influenza, Middle East Respiratory Syndrome (MERS), and equine influenza] has been highlighted in previous studies, whose findings were recently summarized by Brooks et al. (2020). In their rapid literature review, the authors included 24 studies reporting evidence on the psychological consequences of quarantine, which entails an overall high prevalence of psychological distress, sense of isolation, anxiety, mood disorders, insomnia, anger and frustration, and even post-traumatic stress disorder (Brooks et al., 2020). Besides the fact that viral outbreaks represent a severe threat to people's lives, the adverse psychological effects of pandemics such as Covid-19 also derive from the consequent economic crisis, with millions of people left out of work or at risk of losing their job (Vigo et al., 2020). For all these reasons, the psychological burden of pandemics has been referred to as a “parallel epidemic” (Yao et al., 2020).

In a study focused on the immediate psychological reactions displayed by the Chinese population during the initial stage of the Covid-19 outbreak (Wang C. et al., 2020), 54% of 1,210 respondents rated the psychological impact of the situation as moderate or severe, with depressive and anxiety symptoms reported by 16 and 29% of participants, respectively. Moreover, 75% of the participants were worried about their family members contracting the disease and were satisfied with the available health information. Risk factors associated with worse psychological conditions were female gender, student status, presence of physical symptoms such as myalgia, dizziness, coryza, and overall poor self-related health status, while appropriate preventive measures (such as hand washing and wearing a mask) and detailed health information were associated with better psychological outcomes.

In another study (Wang H. et al., 2020), younger, unmarried individuals, with poor social support, reported higher psychological distress than the rest of the sample. People with pre-existing physical and mental disorders (including substance abuse) represent a particularly vulnerable group due to the psychological burden of the pandemic, as well as to disruptions in their care (Vigo et al., 2020). Exposure to Covid-19 news can also influence the psychological impact of the disease by increasing stress and depressive symptoms, especially in individuals who report a high perceived vulnerability to the virus (Olagoke et al., 2020; Yao et al., 2020).

Given this background, more research is needed to further clarify the psychological impact of Covid-19, including risk and protective factors. In this regard, this study aims to examine the psychological consequences of the pandemic in Lombardy, the worst-hit Italian region (Odone et al., 2020). Specifically, our goal was to investigate the association between sociodemographic, household, general health, beliefs and concerns about the

pandemic, and the psychological health of the community, with a specific focus on anxiety and depressive symptoms, and perceived stress.

## MATERIALS AND METHODS

The study used a cross-sectional design, with data collected from 13 April to 10 May 2020 using an online survey that was delivered through the Qualtrics suite (Qualtrics, Provo, UT). Participants were recruited using a snowball sampling procedure, which also involved posting the invitation to participate in the research on social media. We included only participants aged  $\geq 18$  years, resident in Lombardy, and fluent in Italian. The study was approved by the Ethics Commission of the Department of Psychology of Università Cattolica del Sacro Cuore. Before completing the questionnaires, all participants provided electronic informed consent.

### Measures

A researcher-made questionnaire was developed to collect sociodemographic data (age, level of education, employment and marital status, and presence of children), household information (number of people in the same house, presence of pets, size of the house, and presence of garden or balcony), general health status (diagnosed physical or psychological conditions), and Covid-19 related information [Covid-19 diagnosis, concerns about the pandemic (e.g., “To what extent are you concerned about this pandemic?”; 1 = not at all, 4 = extremely), perceived risk for themselves and their significant others (e.g., “To what extent do you perceive yourself at risk due to the pandemic?”; 1 = low risk, 3 = high risk), fear of being infected or infecting others (e.g., “To what extent are you concerned about being infected by others?”; 1 = not at all, 5 = very much), and satisfaction with the information provided by public authorities (i.e., “To what extent are you satisfied with the quality of the information provided by public authorities?”; 1 = not at all, 5 = very much)]. The Italian version of three standardized self-report questionnaires was then used to assess participants' psychological health: (1) the *Generalized Anxiety Disorder-7* (GAD-7; Spitzer et al., 2006; Bruno et al., 2020); (2) the *Patient Health Questionnaire-9* (PHQ-9; Kroenke et al., 2001; Mazzotti et al., 2003); (3) the *Perceived Stress Scale* (PSS; Cohen, 1994; Mondo et al., 2019).

The GAD-7 is a 7-item measure that allows the rapid detection of generalized anxiety disorder (GAD). Participants are asked to rate on a 4-point Likert scale (0 = not at all; 3 = nearly every day) how often they have been bothered by anxiety symptoms in the past 2 weeks. The global score ranges from 0 to 21, with higher scores indicating greater GAD. Scores of 10 or higher indicate possible clinically significant conditions (Spitzer et al., 2006).

The PHQ-9 is a widely used 9-item questionnaire for the screening of depression in non-psychiatric settings. The PHQ-9 detects the presence of a wide range of depressive symptoms (such as anhedonia, depressed mood, trouble sleeping, tiredness, and even suicidal thoughts) based on their frequency in the last 2 weeks, which is rated on a 0–3 Likert scale (0 = not at all; 3 = nearly every day). The PHQ-9 total score ranges

<sup>1</sup><https://www.who.int/news/item/27-04-2020-who-timeline---covid-19>



**TABLE 1 |** Socio-demographic, household, and pandemic-related information, and general health status.

Type of information		
<b>Socio-demographic information</b>		
Level of education		%
	Primary/elementary school	0.6
	Middle school	5.6
	High school	50.8
	University (bachelor's degree)	14.7
	University (master's degree)	18.8
	Doctoral degree	9.5
Occupational status		
	Full-time worker	35.4
	Part-time worker	8.5
	Self-employed	15.0
	Student with part-time job	6.0
	Student	13.8
	Retired	10.0
	Home-maker/ housewife	6.6
	Unemployed	4.7
Marital status		
	Unmarried	40.9
	Married/ cohabitating	51.3
	Separated/ divorced	6.9
	Widowed	0.9
Presence of children		
	No	49.5
	Yes	50.5
<b>Household information</b>		
House size		%
	≤50 m <sup>2</sup>	2.3
	51–100 m <sup>2</sup>	50.5
	101–120 m <sup>2</sup>	14.6
	121–150 m <sup>2</sup>	12.7
	≥150m <sup>2</sup>	19.9
Presence of a balcony		
	No	11.7
	Yes	88.3
Presence of a garden		
	No	51.7
	Yes	48.3
Presence of pets		
	No	54.9
	Yes	45.1
<b>Pandemic-related information</b>		
Worries about the pandemic	(Four-point Likert scale)	M (SD) 3.18 (0.59)%
	Not worried at all	1.3
	Slightly worried	6.3
	Moderately worried	66.1
	Extremely worried	26.3
Risk perception	(Three-point Likert scale)	M (SD) 1.92 (0.66)%
	Low risk	26.3
	Moderate risk	55.5
	High risk	18.2
Concern about being infected by others	(Five-point Likert scale)	M (SD) 3.14 (0.82)
Concern about infecting others	(Five-point Likert scale)	M (SD) 3.26 (1.09)
Diagnosed with Covid-19		%57.4
	No	2.8
	Yes	39.5
	I don't know	0.3
	I prefer not to answer	0.3
Family members diagnosed with Covid-19		61.5
	No	7.0
	Yes	31.5
	I don't know	–
	I prefer not to answer	–
Friends or coworkers diagnosed with Covid-19		32.9
	No	32.9
	Yes	40.4

(Continued)

**TABLE 1 |** Continued

Type of information		
<b>Socio-demographic information</b>		
		%
	I don't know	26.4
	I prefer not to answer	0.3
Loss of a loved one due to Covid-19		
	No	70.7
	Yes	27.1
	I prefer not to answer	2.2
Frequency of going out in the last month		
	Never	20.1
	Once a week	50.8
	Several times a week	16.6
	Everyday	11.9
	Many times a day	0.6
Satisfaction about public information	(Five-point Likert scale)	M(SD) 2.49 (0.82)
<b>General health-related information</b>		
		%
Diagnosed with a chronic disease		
	No	75.9
	Yes	24.1
Under medical treatment		
	No	69.6
	Yes	30.4

**TABLE 2 |** Descriptive statistics of the scales.

	M (SD)	Median	Skewness		Kurtosis	
			Statistics	SE	Statistics	SE
GAD-7	6.52 (4.6)	6	1.284	0.137	1.279	0.272
PHQ-9	6.25 (4.3)	5	1.502	0.137	3.263	0.272
PSS-10	18.48 (3.0)	18	-0.614	0.139	3.799	0.277

from 0 to 27, with greater scores indicating worse psychological conditions. Similarly to the GAD-7, scores  $\geq 10$  indicate clinical cases (Gilbody et al., 2007).

The PSS is a 10-item questionnaire for assessing the perception of stress. Specifically, participants are asked to rate on a 0–4 Likert scale (0 = never; 4 = very often) how often they felt upset, nervous, unable to control and to cope with things in their life, angered, and overwhelmed, focusing on the last month. After reversing four positively stated items, all items are summed to obtain a total score that ranges between 0 and 40, with higher scores indicating greater perceived stress. Scores ranging from 0 to 13, 14 to 26, and 27 to 40 indicate low, moderate, and high stress, respectively (Cohen, 1994).

In this study, all these scales showed good internal consistency (Cronbach's  $\alpha$  was 0.894 for the GAD-7, 0.830 for the PHQ-9, and 0.925 for the PSS).

## Statistical Analyses

Once obtained the descriptive statistics, we examined whether the scores of the GAD-7, the PHQ-9, and the PSS-10 were normally distributed, considering skewness and kurtosis ( $-1/ + 1$  was established as the acceptable range for normality). Given that these variables were not normally distributed, and

**TABLE 3** | Spearman's correlations coefficients among continuous variables.

Variables	2	3	4	5	6	7	8	9
GAD-7	0.697***	0.455***	-0.168***	0.239***	0.055	0.208***	0.139	-0.030
2. PHQ-9		0.455***	-0.255***	0.125	0.027	0.121	0.136	-0.036
3. PSS-10			-0.238***	0.067	0.007	0.074	0.059	-0.005
4. Age				0.286***	0.284***	0.105	-0.073	-0.159**
5. Worries about the pandemic					0.348***	0.514***	0.260***	-0.112
6. Risk perception						0.369***	0.303***	-0.116
7. Concern about being infected by others							0.467***	0.042
8. Concern about infecting others								-0.022
9. Satisfaction about public information								

\*\* $P_s < 0.01$ ; \*\*\* $P_s < 0.001$ .

considering that our analytic strategy involved comparisons between unbalanced groups, statistical analyses were performed using a non-parametric approach. Specifically, relations between continuous variables (such as for instance age and psychological symptoms) were explored using Spearman's correlation. Group comparisons were conducted using the Mann-Whitney *U*-test or the Kruskal-Wallis *H*-test, as appropriate. Because our analytic strategy involved multiple comparisons,  $P_s < 0.01$  were considered statistically significant. All statistical analyses were performed using the software SPSS, version 25.

Statistical power was computed based on previous data collected by our Department (Pagnini et al., 2020) using a conservative approach, suggesting a correlation between worries and well-being around 0.182. Under these circumstances, a sample of 313 participants would allow a power of 0.90. The power analysis was conducted using the software G\*Power 3.1 (Faul et al., 2009).

## RESULTS

Our participants were 319 residents of Lombardy aged between 18 and 78 years old ( $M = 42.95$ ;  $SD = 16.85$ ). Most participants were women (81% vs. 19% of men). The characteristics of the sample based on the information collected using the researcher-made questionnaire (i.e., socio-demographic, household, health-related, and pandemic-related information) are reported in **Table 1**, while median, means and standard deviations for psychological health assessed using the GAD-7, the PHQ-9, and the PSS-10 are presented in **Table 2**. Considering the cut-offs of these three questionnaires, we found that 18.5% of the participants reported clinically significant anxiety, 17.6% had clinical depression (with 12.2% of participants having clinically significant symptoms of both anxiety and depression), while moderate levels of perceived stress were reported by most participants (96%).

Correlations between variables are shown in **Table 3**. We found that younger age was associated with higher anxiety, depression, and perceived stress ( $P_s < 0.001$ ). In addition, the more our participants were worried about the pandemic and concerned about being infected by others, the greater were their symptoms of anxiety ( $P_s < 0.001$ ).

Mann-Whitney *U*-test and Kruskal-Wallis test analyses revealed several statistically significant differences among participants as regards psychological health. Specifically, compared with men, women reported higher levels of anxiety ( $U = 10.663$ ;  $P < 0.001$ ) and depressive symptoms ( $U = 10.841$ ;  $P < 0.001$ ). Furthermore, group differences related to marital status were detected for all psychological health outcomes, such that unmarried participants reported greater symptoms of anxiety ( $H = 15.358$ ;  $P = 0.002$ ) and depression ( $H = 21.146$ ;  $P < 0.001$ ), and higher perceived stress ( $H = 17.378$ ;  $P = 0.001$ ) than married or cohabitating couples. Participants who reported having children showed lower anxiety ( $U = 9.688$ ;  $P < 0.001$ ) and depression ( $U = 9.283$ ;  $P < 0.001$ ), as well as less perceived stress ( $U = 9.362$ ;  $P = 0.001$ ) than participants without children.

In addition, considering participants' occupational status, significant group differences emerged on depressive symptoms ( $H = 21.128$ ;  $P = 0.004$ ) and perceived stress ( $H = 25.638$ ;  $P = 0.001$ ). Specifically, retired people reported the lowest levels of depressive symptoms followed by self-employed individuals, whilst the highest levels of depressive symptoms were detected among students with a part-time job. Considering perceived stress, the lowest levels were reported by retired participants and the highest levels by students and students with a part-time job.

Household characteristics (such as having pets, having a balcony or a garden) did not affect psychological outcomes. No significant effects were found when we examined the associations between other Covid-19 related information (such as being diagnosed with Covid-19 and having lost a loved one due to the disease), general health status, and psychological health.

## DISCUSSION AND CONCLUSION

We examined the impact of the Covid-19 outbreak on the psychological health (anxiety and depressive symptoms, and perceived stress) of individuals living in Lombardy, one of the worst hit Italian regions. Specifically, the study was conducted during the final period of the lockdown (i.e., 1 month and a half since the beginning of the pandemic), in which very restrictive measures (including confinement) were enacted by the Government to contain the spread of the virus. Our goal was not only to examine the psychological conditions of the community, but also to identify what factors were related to

negative psychological outcomes of such a critical situation, focusing on socio-demographic and housing factors, Covid-19 related aspects, and general health status.

Our findings confirmed that, when the study was conducted, people who lived in Lombardy were worried about Covid-19 (with 92.4% of participants reporting to be from moderate to extremely worried about the pandemic), which confirms results from other Italian studies suggesting that the concerns of the community are associated with the geographical proximity to the center of the pandemic (Pagnini et al., 2020). Moreover, in our research, participants' worries related to Covid-19 (including concerns about being infected by others) were associated with worsened psychological conditions, which corroborates the conclusions of other studies highlighting the negative emotional consequences of the current pandemic (Eisazadeh et al., 2020). Women, unmarried individuals, and students were the most affected groups, with poorer psychological outcomes than the rest of the sample. Overall, the general high levels of concern found in our participants can be partially explained by the fact that most of the respondents (81%) were females. In this regard, a study by Gerhold (2020) showed that women are more likely to be worried about the pandemic than men.

Surprisingly, participants' younger age was associated with greater worries about the pandemic. This is interesting, especially if one considers that younger people reported worsened psychological conditions in other Covid-19 studies (e.g., Wang H. et al., 2020) and that, based on our findings, students were more distressed than other groups. In this regard, the uncertainty related to the sudden, unexpected transition to distance learning, and concerns about the future (including procedures for assignments and evaluations; see Sahu, 2020) might have played an important role, with negative effects on the psychological health of this younger subgroup of people. It should also be considered that young people may be overrepresented in the other distressed categories identified in our study (unmarried people, people without children, and students). Taken together, our findings suggest that assessing people's worries and risk perception is important, since these subjective aspects may significantly impact on their psychological conditions and behaviors, also related to the adoption of correct preventive strategies (Khosravi, 2020).

In this study, we also examined the role of housing conditions, with the hypothesis that these factors might have affected the individuals' psychological health during the lockdown. Surprisingly we did not find any significant effect of housing characteristics, such as house size, having a balcony or a garden. Indeed, there is need for more research to further understand what type of household situations are associated with mental health outcomes when people are confined to their homes during pandemics. This is particularly important considering that other Covid-19 outbreaks are expected in the next future.

Our data suggest that social isolation negatively affects the psychological health of the community, especially among young unmarried individuals without children. As underlined in other studies, people who are more socially connected live longer and healthier than isolated individuals (Umberson and Montez, 2010). In this regard, social support

can contribute to increase self-monitor and self-control (Pilcher and Bryant, 2016), which represent important resources while coping with stressful situations. At the same time, conjoint efforts to cope with a stressor as a couple may lead to enhanced couple satisfaction (Molgora et al., 2019). On the other hand, forced cohabitation and greater levels of stress due to the pandemic may increase the risk of domestic violence and abuse (Barbara et al., 2020; Bradbury-Jones and Isham, 2020). This issue is very important and requires further research. Despite the significant number of studies conducted during the Covid-19 outbreak, there is still a gap in the literature regarding how couples and families cope with this stressful situation. Our findings, combined with those from other studies (Saita et al., 2016), suggest that promoting couple adaptive behavioral and emotional coping strategies (i.e., positive dyadic coping) may be particularly useful in situations that entail dealing with a disease (including the threat of a disease, for those who have not been infected by Covid-19).

Besides the interesting findings reported in this article, our study presents several limitations. First, our sample is not fully representative of the general population due to self-selection bias, since most participants were female. Second, the cross-sectional nature of the research design did not allow to investigate adjustment trajectories over time, which is very important, given the rapid changes of the situation.

Despite these limitations, our study contributed to clarify the short-term psychological impact of the disease by identifying individual characteristics associated with more negative psychological outcomes. Therefore, our findings may offer interesting suggestions for future studies and interventions aimed at promoting the psychological health of the community during pandemics.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article are available from the corresponding author on reasonable request.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Commission of the Psychology Department Catholic University of Sacred Heart. Participants provided electronic informed consent.

## AUTHOR CONTRIBUTIONS

ES developed the main conceptual idea. SM conducted the statistical analysis. FF completed the literature review and finalized the research questions. ES, FF, and SM took the lead in writing the manuscript. FP provided critical feedback and helped shape the research, analysis and manuscript. All authors conceived and planned the methods and contributed to data collection.

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# Associations Between Childhood Abuse and COVID-19 Hyperarousal in Adulthood: The Role of Social Environment

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**Background:** Childhood abuse increases risk for high levels of distress in response to future stressors. Interpersonal social support is protective for health, particularly during stress, and may be particularly beneficial for individuals who experienced childhood abuse.

**Objective:** Investigate whether childhood abuse predicts levels of posttraumatic stress disorder (PTSD) symptoms related to the COVID-19 pandemic, and test whether the perceived availability of social companionship preceding the pandemic moderates this relationship.

**Methods:** During Phase 1, adults ( $N = 120$ ; Age  $M[SD] = 19.4 [0.94]$ ) completed a retrospective measure of childhood adversity along with a measure of perceived availability of opportunities for social engagement immediately preceding the pandemic. Two weeks after the COVID-19 pandemic declaration, participants completed the Impact of Event Scale-Revised (IES-R) with respect to the pandemic. Hierarchical linear regression analyses examined the interaction between childhood abuse and the perceived availability of social companionship preceding the pandemic as a predictor of PTSD symptoms.

**Results:** Adjusting for covariates, the interaction between childhood abuse and perceived availability of others to engage with before the onset of the pandemic was a significant predictor of IES-hyperarousal ( $\beta = -0.19$ ,  $t = -2.06$ ,  $p = 0.04$ ,  $\Delta R^2 = 0.032$ , CI:  $[-0.31$  to  $-0.01]$ ).

**Conclusion:** Levels of perceived opportunities for social companionship before the pandemic associates with levels of hyperarousal related to the pandemic, particularly for individuals who experienced high levels of childhood abuse. More research is needed to understand how to mitigate the higher levels of distress related to the pandemic for these individuals in order to reduce risk for future psychiatric disorders.

**Keywords:** childhood abuse, hyperarousal, social support, COVID-19, PTSD, adults

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## INTRODUCTION

A robust body of work highlights the long lasting implications of childhood abuse for health-relevant behaviors and outcomes into adulthood (e.g., Springer et al., 2003; Maniglio, 2009; De Bellis and Zisk, 2014; Beilharz et al., 2020). For example, trauma and abuse during childhood are risk factors for psychological distress and psychiatric disorders in adulthood (Duncan et al., 1996; Yehuda et al., 2001; Min et al., 2007; Shonkoff et al., 2009; Rogosch et al., 2011; Edwards et al., 2014; Nemeroff, 2016). It is theorized that in response to early life stress, the brain coordinates and regulates behaviors and physiological responses to stress in order to help the individual adapt to the demands of their environment (Hostinar and Gunnar, 2013). The experience of abuse is embedded into the regulation of stress systems in a way that shapes responses to future stressors (Berens et al., 2017).

While it is well known that a single stressor or stressful event can produce an ongoing cascade of event-related pathology, stressful events impact individuals differently (Lewis, 1992; Meaney et al., 1993; Bowman, 1997; Kirschbaum et al., 2008). For some individuals, their response to the stressor could result in a diagnosis of posttraumatic stress disorder (PTSD) or subclinical symptomatology. Previous work indicates that childhood abuse is one factor which sensitizes individuals to future stressful events (Harkness et al., 2006; McLaughlin et al., 2010; Gouin et al., 2012; Nakai et al., 2014; Shapero et al., 2014; Asselmann et al., 2018). For example, in children who have experienced a natural disaster, previous exposure to trauma is an important predictor of post-disaster traumatic stress (Neuner et al., 2006). Separately, in veterans, reports of childhood abuse were higher in veterans with combat related PTSD compared to rates of PTSD in veterans who did not have combat-related PTSD, a relationship that was independent of levels of combat exposure (Bremner et al., 1993). Furthermore, a separate investigation found that childhood abuse changes psychological responses to future trauma, with greater reports of childhood abuse associating with higher levels of shame following the experience of a violent crime (Andrews et al., 2000). Together these findings provide compelling evidence that the experience of childhood abuse shapes the way in which individuals respond to future traumas or stressors.

A separate body of research links perceptions of social support to a variety of health outcomes (Cohen and Syme, 1985; Theorell et al., 1995; Brady and Helgeson, 1999; Wang et al., 2003; Uchino, 2006, 2009; Reblin and Uchino, 2008; Taylor, 2011). A perceived lack of social support and companionship can exacerbate illness and has been identified as a risk factor for poor psychological well-being (Avison and Gotlib, 1994; Cohen et al., 1997). According to the stress buffering hypothesis (Cohen and Wills, 1985), interpersonal social support can have a positive impact on health through preventing or dampening stress responses. For example, following a natural disaster, perceived social support was found to moderate the stressor–distress relationship, with individuals who reported lower levels of social support reporting more disaster related distress (Arnberg et al., 2012). Separately, previous findings indicate that social support and resources may be particularly important in the

context of stress or adversity (John-Henderson et al., 2015), and in a prospective investigation, social support was found to mediate and moderate long-term consequences of childhood maltreatment (Sperry and Widom, 2013). Levels of interpersonal support and social engagement prior to a stressful event, may be particularly important in shaping psychopathology during uncertain times, and may be most important for individuals who have experienced early life trauma.

Based on previous work, infectious disease outbreaks elicit psychological responses (Sim et al., 2010; Shah et al., 2020; Xiang et al., 2020). The uncertainty which characterizes these outbreaks can contribute to increased levels of distress and PTSD symptoms (Cheng and Cheung, 2005; Lee et al., 2018). However, similar to other stressors, the nature of these psychological responses can vary significantly across individuals (Lau et al., 2007; Williams et al., 2012). On March 11, 2020, the novel coronavirus disease (COVID-19) was labeled as a pandemic and was acknowledged as a national emergency in the United States 6 days later. In an effort to reduce the spread of infection, recommendations were issued to stay home and socially distance, prompting individuals to make drastic changes to their daily lives and social environments. In general, previous work indicates that social companionship or the perceived availability of others to socially engage with is a predictor of physical and mental health (Seeman, 1996; Hale et al., 2005; Ang, 2018). However, it is unknown whether these perceptions would affect levels of distress in the context of a pandemic.

Merging these bodies of work, we hypothesize that childhood abuse may predict greater distress symptoms at the onset of the COVID-19 pandemic, in particular for those individuals who reported low levels of interpersonal support preceding the pandemic. While there are many dimensions of social support, we chose to focus on interpersonal support as reflected by the perceived availability of persons with whom one could engage in activities, because this social resource may be particularly protective as individuals enter a period of time where opportunities for social engagement are limited. In the context of the COVID-19 pandemic, it is possible perceived social companionship before social distancing recommendations were implemented, shaped the degree to which the stressor and associated changes in the social environment affected subsequent mental health.

## METHODS

Participants ( $N = 120$ , 72% female; mean [standard deviation] age = 19.4 [0.94] years, age range 18–24 years; 69.3% White) were a subsample of an ongoing research study (total participants contacted from ongoing study  $N = 457$ ). Exclusion criteria of the original study included a history of cardiovascular disease or current illness/infection. The initial laboratory visit (Phase 1) took place in Central Texas between January 2019 and February 2020. During this phase demographics, reports of childhood abuse, and perceived availability of social engagement and companionship were measured. During the second part of the

study (Phase 2) participants resided in 22 different states during the follow-up. Participants completed questionnaires regarding pandemic related distress between March 26, 2020 and April 5, 2020. None of the participants had tested positive for COVID-19 and 87.5% of participants were living in a city/state that had a “shelter in place” order at the time of phase 2 completion. One participant was excluded due to incomplete data. All participants gave informed consent for both phases of the study. For Phase 1, participants were recruited through the university’s SONA system and received course credit. For Phase 2, all participants who completed Phase 1 were contacted and asked to take part in this second study. Participants who chose to take part were entered in a raffle to win one of 15, \$25 gift cards. The studies were approved by the university’s Institutional Review Board.

## Questionnaires Phase 1

Childhood abuse was measured with the 28-item version of the Childhood Trauma Questionnaire (CTQ; Bernstein and Fink, 1998). The CTQ short form is a self-report measure which encompasses experiences from 0 to 17 years of age. The CTQ has five subscales which measure emotional abuse, emotional neglect, physical abuse, physical neglect, and sexual abuse. Each item uses a five-point frequency of occurrence scale: (1) never true, (2) rarely true, (3) sometimes true, (4) often true, and (5) very often true. In previous work, the CTQ short form has been found to be reliable and valid ( $\alpha = 0.61 - 0.95$ ; Bernstein et al., 2003). Following previous work (McLaughlin et al., 2014) we calculated a threat score using subscales from the CTQ. Childhood threat has been associated with higher levels of future internalizing and externalizing symptoms (Miller et al., 2018) and high levels of psychological distress (Hughes et al., 2007; Llabre et al., 2015). The threat score consists of sum of the following subscales: physical abuse, sexual abuse, and emotional abuse. Cronbach’s alpha for the threat score in the present study was 0.617.

Interpersonal social support and resources were measured using the Interpersonal Support Evaluation List –Short version (ISEL-12; Cohen and Hoberman, 1983). The ISEL-12 is a self-report questionnaire with 12 statements regarding the perceived availability of social resources and support. We focused on the belonging subscale of the ISEL-12 which is meant to assess the

perceived availability of persons to engage in social activities with (Cohen et al., 1985). An example item from the belonging scale is, “If I wanted to have lunch with someone, I could easily find someone to join me.” Participants respond to each question using the following scale: 1 (*definitely false*), 2 (*probably false*), 3 (*probably true*), and 4 (*definitely true*). Higher scores on this measure reflect a perceived greater ability to engage with others in social activity before the pandemic. The belonging subscale demonstrated good internal consistency in this sample (Cronbach  $\alpha$ s > 0.790).

## Questionnaires Phase 2

Participants who had completed the larger study were sent an email on March 26, 2020 notifying them about the opportunity to participate in a follow-up study online. In this follow-up they completed the Impact of Events Scale-Revised (IES-R), which is used to assess subjective distress and PTSD symptomology for a specific event (Weiss and Marmar, 1997). In the present study, the life event was the COVID-19 coronavirus pandemic. The IES-R has three subscales, intrusion (e.g., intrusive cognitions, nightmares), avoidance (e.g., avoidance of feelings), and hyperarousal (e.g., anger, trouble concentrating). Item response anchors for this scale are: 0 (*not at all*), 1 (*a little bit*), 2 (*moderately*), 3 (*quite a bit*), and 4 (*extremely*). Each subscale score is computed as the mean item response of the subscale item. The IES-R subscales have good internal consistency in previous work (Craparo et al., 2013) and in this research (Cronbach  $\alpha$ s > 0.791).

## Statistical Analysis

All statistical analyses were conducted using SPSS (version 24; IBM, Armonk, NY). We first examined descriptive statistics and bivariate Pearson correlations between the CTQ threat score, ISEL-belonging scores, IES-R subscales (intrusion, avoidance, and hyperarousal), and demographics. Next, in three separate hierarchical linear regressions, adjusting for age, race, biological sex, and depressive symptoms, we examined whether childhood abuse interacts with perceived availability of others for social engagement preceding the pandemic to predict clusters of PTSD symptoms related to the COVID-19 pandemic. To identify specific values of CTQ threat for which the relationship between ISEL-belonging and IES-hyperarousal is statistically significant in this sample, we used the Johnson-Neyman technique (Rast et al., 2014).

## RESULTS

### Descriptive Statistics

One hundred and twenty participants completed both phases of the study. Participants had a mean (SD) HADS score of 4.25 (2.78) and a CTQ threat score of 19.70 (5.72) during phase 1 of the study. The mean (SD) parental occupational status was 5.94 (1.20). During phase 1 of the study, participants reported an ISEL belonging mean (SD) of 8.82 (2.51). During phase 2 of the study, participants reported mean (SD) scores for the following

**TABLE 1 |** Descriptive statistics.

	Mean (N = 120)	SD/%	Range
Age	19.40	0.94	18.11–24.50
Sex		72.4% (Female)	–
Race		69.3% (White)	–
Parental occupation status	5.94	1.20	2–7
Current depressive symptoms	4.25	2.78	0–32
Childhood threat score	19.70	5.72	15–52
ISEL belonging	8.82	2.51	3–14
IES-R hyperarousal	0.84	0.74	0–3.17

Parental occupation was coded as: 2 = unskilled, 3 = partly skilled, 4 = skilled manual, 5 = skilled non-manual, 6 = skilled managerial, and 7 = professional. ISEL: Interpersonal Support Evaluation List; IES-R: Impact of Events Scale-Revised.

**TABLE 2** | Bivariate correlations of interest variables.

Variable	1	2	3	4	5	6	7	8	9
1. Age	–								
2. Sex	–0.26**	–							
3. Depressive symptoms	0.19*	0.12	–						
4. SES	–0.05	–0.14	–0.20*	–					
5 ISEL-belonging	–0.07	0.23*	–0.42**	0.07	–				
6. CTQ threat	0.05	–0.01	0.21*	–0.30**	–0.16	–			
7. IES-intrusion	0.21*	0.12	0.21*	–0.01	–0.01	0.25**	–		
8. IES-avoidance	0.06	0.17	0.16	–0.08	–0.01	0.20*	0.64**	–	
9. IES-hyperarousal	0.19*	0.09	0.32**	–0.07	–0.07	0.25**	0.84**	0.62**	–

Sex: 1 = male, 2 = female; SES: Socioeconomic status; ISEL: Interpersonal support Evaluation List; IES: Impact of Events Scale.

\*Correlation significant at the 0.05 level (two-tailed).

\*\*Correlation significant at the 0.01 level (two-tailed).

subscales of the IES-R: hyperarousal, 0.84 (0.74), intrusion 0.86 (0.73), and avoidance 1.14 (0.72). See **Table 1** for mean, standard deviation, and ranges of demographic information and descriptive statistics.

## Correlation Analyses

Higher levels of CTQ threat were moderately associated with lower socioeconomic status (SES) and higher depressive symptoms. Females had higher levels of ISEL-belonging. Additionally, there was a moderate association between higher levels of ISEL-belonging were associated with lower levels of depressive symptoms. There was a small association between higher IES-intrusion and IES-hyperarousal associated with being older, having more depressive symptoms at time 1. There was a small association between high CTQ threat was associated with higher scores on all three IES subscale. Lastly, there was a moderate to large association between all three subscales of the IES were related to one another with moderate to large effects. **Table 2** reports the full correlation matrix.

## Hierarchical Regressions

We conducted a series of hierarchical regression to test our main hypothesis. In block 1 we entered age (calculated from reported date of birth), race, biological sex, depressive symptoms, and parental occupation status along with the CTQ threat score and the ISEL-belonging subscale score. In block 2, we entered the interaction term for CTQ threat and ISEL-belonging. We examined whether this interaction term was a significant predictor of IES-intrusion, IES avoidance and IES hyperarousal. The interaction term was not a significant predictor of IES intrusion or IES avoidance ( $\beta = -0.064$ ,  $t = -0.70$ ,  $p = 0.48$  and  $\beta = -0.042$ ,  $t = -0.44$ ,  $p = 0.66$ , respectively). However, we found that the interaction between CTQ threat and ISEL-belonging was a significant predictor of IES hyperarousal ( $\beta = -0.19$ ,  $t = -2.06$ ,  $p = 0.04$ ,  $\Delta R^2 = 0.032$ , CI:  $[-0.31$  to  $-0.01]$ ). This regression model is reported in **Table 3**. Using the Johnson-Neyman technique (Rast et al., 2014), we found that the relationship between ISEL-belonging and IES-hyperarousal was statistically significant for participants who had CTQ threat

scores above 28.63 (possible range: 15–75, observed range: 15–52). Specifically, for individuals with high levels of childhood abuse, low levels of ISEL-belonging predicted higher levels of IES-hyperarousal.

## DISCUSSION

The findings reported here utilize data which were collected before the onset of the COVID-19 pandemic and data from a follow-up which took place during the weeks immediately following its classification as a national emergency in the United States. In a sample of 119 adults, we found that for individuals who reported experiencing high levels of childhood abuse, there was a significant relationship between perceived availability of social companionship preceding the pandemic and distress symptoms related to the pandemic. Specifically, these individuals had higher levels of hyperarousal symptoms related to the pandemic. This cluster of symptoms is characterized by constantly feeling on guard, having difficulty falling or staying asleep, feeling jumpy or easily startled, and feeling irritable.

Given that individuals who experience childhood abuse are known to be at greater risk for psychiatric disorders in adulthood compared to individuals who did not experience

**TABLE 3** | Predictors of IES-R Hyperarousal in hierarchical linear regression model.

	IES hyperarousal		
	$\beta$	$p$	$\Delta R^2$
Age	0.15	0.11	
Sex	0.08	0.41	
Race	–0.16	0.07	
Parental occupation status	0.02	0.87	
Depressive symptoms	0.27	0.01	
Childhood threat score	0.21	0.02	
ISEL belonging	–0.07	0.48	
Childhood threat score $\times$ ISEL belonging	–0.19	0.04	0.032

$N = 120$ .



childhood abuse (Duncan et al., 1996; Shonkoff et al., 2009; Rogosch et al., 2011; Nemeroff, 2016), it is important to understand the risk and protective factors which moderate the relationship between stressful events, PTSD symptoms and subsequent risk for PTSD for this population. Our findings suggest, in the context of the COVID-19 pandemic, high levels of perceived availability of social companionship preceding the pandemic is one such factor which may reduce subsequent risk. It is possible that efforts to increase opportunities for social engagement generally for this at-risk population may help to offset high levels of PTSD symptoms in response to stressful events. Further, during stressful events such as the ongoing COVID-19 pandemic, it is possible that efforts to increase social engagement, even if virtually due to social distancing recommendations, may help to manage their pandemic related distress.

The findings are in line with a body of work indicating a relationship between childhood trauma and risk for psychiatric disorders into adulthood (Widom, 1999; Copeland et al., 2007; Widom et al., 2007). Individuals who experience abuse during childhood exhibit chronically high levels of corticotropin releasing factor (CRF) as adults, which causes generalized arousal, anxiety and hypervigilance, all of which are symptoms of the PTSD hyperarousal cluster (Charney et al., 1993). While we do not measure CRF or other biological proteins which may contribute to observed hyperarousal symptoms, our findings indicate that the relationship between childhood maltreatment and this cluster of PTSD symptoms in response to stress may be moderated by one's social environment preceding the stressor. In light of this observation, it may be important to consider social environments more closely when assessing risk for PTSD following a stressor for this at-risk population.

The findings from this research could have clinical implications for the development of interventions which could benefit adults who experienced childhood abuse, specifically in the context of a life event such as the COVID-19 pandemic. Based on the pattern of observed findings, interventions which provide these adults with opportunities for social engagement could be useful in dampening distress levels related to the event. In the context of live events which make in-person social engagement challenging (e.g., the COVID-19 pandemic), social engagement

opportunities could be made available online or using social media platforms.

This research has important limitations. First, while the study is prospective, it is still correlational, and it remains possible that the pattern of our results are affected by a separate variable or construct (Christenfeld et al., 2004). However, the pattern of results we observed accounted for variables which may be related to our outcome variables including age, biological sex, ethnicity and depressive symptoms. Second, since the symptoms measured using the IES-R had not persisted over a period of a month, the participants in this sample do not meet diagnostic and statistical manual of mental disorders (DSM)-V criteria and the IES-R is not an official diagnostic criteria instrument for PTSD.

Overall, our findings provide initial evidence, that low levels of perceived availability of social companionship and opportunities for social engagement with others preceding a stressful event, may be a social risk factor for subsequent development of subclinical PTSD symptoms and potentially future PTSD diagnosis.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Baylor University Institutional Review Board. The participants provided their written and informed consent to participate in the study.

## AUTHOR CONTRIBUTIONS

AG designed the research study, collected the data, and participated in writing the manuscript. CC helped with the data analyses and preparation of findings for the manuscript. NJ-H analyzed the data and wrote the manuscript. All authors contributed to the article and approved the submitted version.

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# Further to the Left: Stress-Induced Increase of Spatial Pseudoneglect During the COVID-19 Lockdown

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**Background:** The measures taken to contain the coronavirus disease 2019 (COVID-19) pandemic, such as the lockdown in Italy, do impact psychological health; yet, less is known about their effect on cognitive functioning. The transactional theory of stress predicts reciprocal influences between perceived stress and cognitive performance. However, the effects of a period of stress due to social isolation on spatial cognition and exploration have been little examined. The aim of the present study was to investigate the possible effects and impact of the COVID-19 pandemic on spatial cognition tasks, particularly those concerning spatial exploration, and the physiological leftward bias known as pseudoneglect. A right-hemisphere asymmetry for spatial attention processes crucially contributes to pseudoneglect. Other evidence indicates a predominantly right-hemisphere activity in stressful situations. We also analyzed the effects of lockdown on coping strategies, which typically show an opposite pattern of hemispheric asymmetry, favoring the left hemisphere. If so, then pseudoneglect should increase during the lockdown and be negatively correlated with the efficacy of coping strategies.

**Methods:** One week before the start of the lockdown due to COVID-19 in Italy (T1), we had collected data from a battery of behavioral tests including tasks of peri-personal spatial cognition. During the quarantine period, from late April to early May 2020 (T2), we repeated the testing sessions with a subgroup of the same participants (47 right-handed students, mean age = 20, SD = 1.33). At both testing sessions, participants performed digitized neuropsychological tests, including a Cancellation task, Radial Arm Maze task, and Raven's Advanced Progressive Matrices. Participants also completed a newly developed COVID-19 Student Stress Scale, based on transactional models of stress, and the Coping Orientation to Problems Experienced—New Italian Version (COPE-NIV) to assess coping orientation.

**Results:** The tendency to start cancellation from a left-sided item, to explore first a left-sided arm of the maze, and to choose erroneous response items on the left side of the page on Raven's matrices increased from T1 to T2. The degree of pseudoneglect



increment positively correlated with perceived stress and negatively correlated with Positive Attitude and Problem-Solving COPE-NIV subscales.

**Conclusion:** Lockdown-related stress may have contributed to increase leftward bias during quarantine through a greater activation of the right hemisphere. On the other hand, pseudoneglect was decreased for better coping participants, perhaps as a consequence of a more balanced hemispheric activity in these individuals.

**Keywords:** cognition, psychology, stress, pseudoneglect, coronavirus, quarantine, pandemic

## INTRODUCTION

Coronavirus disease 2019 (COVID-19) broke into a worldwide pandemic (World Health Organization, 2020) at the beginning of 2020. At the time of writing, there are more than 7.5 million confirmed cases throughout 215 countries, with more than 400,000 deaths. Italy was the first European Union (EU) country to be hit by a dramatic COVID-19 outbreak, with a quick and heavy impact on public physical and psychological health. Millions of people have experienced an abrupt change in their lives, due not only to the spreading of the illness but also to the measures put in place to prevent the contagion and limit the outbreak. On March 9, 2020, the Italian government imposed a national quarantine and several consequent lockdown restrictions, which ended on May 4, 2020, for some activities and on May 18, 2020, for others. Thus, the Italian quarantine lasted 70 days.

Brooks et al. (2020) examined previous research on the psychological impact of quarantine and reported a high prevalence of symptoms of psychological distress and disorder: especially low mood and irritability, but also emotional disturbance, depression, stress, insomnia, post-traumatic stress symptoms, etc. Moreover, they found that the effects of security measures due to a pandemic can affect not only short-term but also long-term psychological state (Brooks et al., 2020). Poor sleep quality, for example, can affect mental health (Gehrman et al., 2013; Franceschini et al., 2020) and alter emotional and cognitive functioning (Altena et al., 2020). As emphasized by the American Psychological Association (Novotney, 2020), social isolation can trigger several health risks. Feeling isolated can lead to poor sleep, poor cardiovascular health, depressive symptoms, and impaired executive function. These effects tend to impair the ability to stay focused, emotional control, retrieval of information, and the capacity to follow directions. Even brief periods of loneliness and isolation can have negative consequences on both physical and mental well-being (Cacioppo and Patrick, 2008).

Restrictions could affect different life domains among students, inducing specific perceived stressors related to academic studying, relationships with university colleagues, relationships with professors, social isolation, risk of contagion, relationships with relatives, and sexual life (Zurlo et al., 2020). Moreover, restrictions could also affect physical activity, socializing (except virtual social media), proper nutrition, and good quality of sleep. These restrictions were likely to result in increased stress and psychological disease (Mandolesi et al., 2018; Brooks et al., 2020; Zurlo et al., 2020) as well as in recourse to coping strategies

to deal with it. However, less is known about the potential impact of quarantine on spatial cognition, a heterogeneous set of processes incorporating spatial memory (Mandolesi et al., 2009b; Sorrentino et al., 2019), egocentric and allocentric representation and mapping abilities (Klatzky, 1998; Foti et al., 2020), and visuo-perceptive abilities, including spatial attention (Newcombe and Huttenlocher, 2007; Bartolomeo et al., 2012; Newcombe, 2018; Bartolomeo and Malkinson, 2019; Bartolomeo, 2020).

The transactional theory of stress predicts a reciprocal influence between perceived stress and cognitive performance and underlines the key role played by individual differences, such as coping strategies, in influencing this relationship (Lazarus and Folkman, 1984; Matthews et al., 2000). The individual adaptation process to a significant source of stress (such as the current COVID-19 pandemic lockdown) consists of appraisals of primary control (i.e., perceived possibilities to modify the situation to reduce its negative impact) and secondary control (i.e., perceived possibilities to modify the appraisal of circumstances to achieve a positive adjustment).

Thus, similar sources of stress may have a different subjective impact. Stress is a dynamic concept, depending on the constant interplay between individual and situational factors that reciprocally influence each other, and the potential efficacy of the different coping strategies adopted to deal with perceived stress and to enhance adjustment is strongly situation-specific and related to the interaction between the individuals and the situations (Zurlo et al., 2013, 2019). From this perspective, in particular, a perceived lack of controllability can lead to lower levels of performance (Matthews and Campbell, 2009).

Little is known about the effects of a period of stress (such as quarantine and social isolation) on spatial cognition. Animals being exposed to chronic stress show impaired exploratory behavior (Brydges et al., 2012; ter Horst et al., 2012; van der Kooij et al., 2018). Rats exposed to chronic stress in their early life show atypical leftward asymmetry in turning behavior (Mundorf et al., 2020). In particular, stress might play different roles at different stages of development: early exposition might lead to structural brain changes, whereas later exposition might modulate functional aspects (Berretz et al., 2020).

Gruzelier and Phelan (1991) found that stress was able to shift the hemispheric balance in a divided visual field lexical task toward the left visual field in a sample of medical students. Richardson and VanderKaay Tomasulo (2011) induced stress in human participants by using the frustrating Star Mirror Tracing Task and found slower spatial responses in a navigation task and a perspective taking task, as compared with non-stressed control

participants. However, Schwabe et al. (2007) found no evidence of an effect of stress on spatial learning, and Duncko et al. (2007) found improved performance on a virtual navigation task after hand immersion in ice water (cold pressor stress).

Directional spatial effects offer a possibility to quantify the effects of stress on spatial cognition. A basic, evolutionarily conserved pattern of asymmetry sees the right hemisphere taking control of responses to novel, unpredicted and potentially dangerous changes in the environment (Compton et al., 2000; Vallortigara and Versace, 2017; Bartolomeo and Malkinson, 2019). Another, well-known pattern of asymmetry favoring the human right hemisphere concerns the fronto-parietal brain networks important for orienting and control of spatial attention (Corbetta et al., 2008; Bartolomeo and Malkinson, 2019). A relative hyperactivity of right-hemisphere attention networks might push spatial attention leftward. This directional attention bias contributes to a small, physiological leftward bias in spatial processing (Toba et al., 2011), labeled pseudoneglect (Bowers and Heilman, 1980). Pseudoneglect can manifest itself during the bisection of horizontal lines, as a small leftward deviation of the subjective midpoint (Jewell and McCourt, 2000) or as a bias to start visual search from a left-sided item (Gigliotta et al., 2017).

Evidence on structural and functional brain asymmetries regarding attention networks and stress response (both involving the right hemisphere, see Ocklenburg et al., 2016; Zach et al., 2016; Gigliotta et al., 2017) led us to hypothesize a relation between stress and pseudoneglect. Specifically, two predictions were made: (1) higher level of stress should increase the magnitude of pseudoneglect and (2) effective coping strategies that may preferentially reduce right-hemisphere activation (Lindauer et al., 2008) should reflect in a lower magnitude of pseudoneglect. Just before the beginning of the COVID-19 lockdown, we had assessed visuospatial performances in a group of Italian university students. Thus, we had the unique opportunity to test our predictions by comparing students' performances before and during the lockdown.

## MATERIALS AND METHODS

### Participants

Throughout the month of February 2020, before the Italian lockdown, we conducted data collection sessions on personal spatial cognition tasks. The data collection ended on March 2, exactly 1 week before the start of the lockdown due to COVID-19 in Italy. We therefore decided to perform a second data collection with the same participants during the quarantine period. Specifically, the session lasted 2 weeks from late April to early May.

Before the beginning of the lockdown, 102 Psychology and Philosophy students (81 females) of the University of Naples Federico II aged between 18 and 26 years (mean = 19.5, SD = 1.5) voluntarily enrolled in the first experimental session. Selection criteria for participants' recruitment included normal or corrected-to-normal vision. Students were contacted later on during quarantine, and 55 out of 102 students agreed to participate in the second session. Seven out of 55 participants

were excluded because they reported left hand preference. Left-handers were excluded because of evidence of higher performance variability on visuospatial tasks (see, for example, Sampaio and Chokron, 1992) and of decreased pseudoneglect effects (Jewell and McCourt, 2000). One additional participant did not conclude the session because of technical problems. The final sample consisted of 47 right-handed students, aged between 18 and 24 years (mean = 20, SD = 1.33), 41 females and 6 males.

Written informed consent was obtained from all participants. The study was approved by the Local Ethics Committee of the University of Naples Federico II (protocol number: 12/2020) and was carried out in accordance with the Declaration of Helsinki.

## Measures

### Neuropsychological Tests

#### *Cancellation Task*

In the present study, we administered a digitized Cancellation task developed by Gigliotta et al. (2017). Each trial starts with participants touching (or clicking on) a green button located at the center of the screen. Participants are then presented with five round red stimuli randomly arranged on an electronic screen. They have to cancel all the stimuli as fast as possible with a stylus pen touch or a mouse click (depending on the user interface). The canceled item changes in color to a brighter nuance of red. Thirty trials were administered, with randomly different spatial disposition of targets.

#### *Radial Arm Maze Task*

The Radial Arm Maze (RAM; Olton and Samuelson, 1976) consists of a central area with identical radiating arms. It is extensively used to assess the spatial abilities of laboratory rodents and human participants (Overman et al., 1996; Mandolesi et al., 2009a,b; Foti et al., 2011, 2020). The aim is to recover rewards hidden at the end of each arm. Different strategies can be implemented (for example, visit a specific sequence of arms, adjacent, opposite, or alternating, etc.). We used a digitized version (Mandolesi and Gigliotta, submitted) whereby participants control a ladybug, positioned in the center of the labyrinth, along the arms to retrieve hidden ladybugs placed at the end of each arm. There were six trials, with a time limit of 60 s per trial. The number of arms gradually increased over trials from 3 to 8 arms. In the present work, we analyzed results from the 8-arm maze, the condition with the highest spatial resolution.

#### *Raven's Advanced Progressive Matrices*

The Raven's Advanced Progressive Matrices (APM; Raven et al., 1962) are used to assess non-verbal and "fluid" intelligence and require the direct analysis, construction, and integration of a series of visual items. Raven's matrices questions consist of visual geometric designs with a missing piece. Participants are asked to choose the missing piece between eight alternatives, arranged along four vertical columns disposed from the left to the right of the page below the test image. A digital version of the Raven's APM was administered in the present study, for which the matrices were transposed on Google Modules. Only set I (12 items with 8 possible responses) was administered.

Costa et al. (1969) administered the Raven's APM to patients suffering from left neglect after right-hemisphere damage and assessed the spatial side (left or right) of the error responses. The results showed that patients tended to erroneously choose right-sided items. Colombo et al. (1976) administered Raven's APM to patients with left and right brain injuries and found that patients tended to prefer ipsilesional candidate items. This position preference was especially evident in patients with right-hemisphere damage. This evidence, suggesting that spatial biases can influence performance on the Raven's APM, incited us to employ such a space-based assessment in the present setting.

## Questionnaires

### The COVID-19 Student Stress Questionnaire

The COVID-19 Student Stress Questionnaire (CSSQ; Zurlo et al., 2020) was specifically developed to assess university students' perceived stress during the COVID-19 pandemic lockdown. It consists of 7 items on a 5-point Likert scale ranging from 0 ("not at all stressful") to 4 ("extremely stressful"). For the purpose of instrument design, perceived stress was operationalized based on transactional models of stress (Lazarus and Folkman, 1984). Each item was developed to cover different domains that could have been subject to variations due to the COVID-19 pandemic lockdown and, therefore, that may be potentially perceived as sources of stress (i.e., risk of contagion; social isolation; relationship with relatives; relationship with colleagues; relationship with professors; academic studying; couple's relationship, intimacy, and sexual life). The scale provides a Global Stress score ranging from 0 to 28. The CSSQ was developed and tested in a sample of 514 Italian university students, and it was confirmed to be a valid and reliable measure. The Global Stress score revealed significant correlations, in the expected directions, with measures of Anxiety ( $r = 0.55$ ,  $p < 0.01$ ), Depression ( $r = 0.56$ ,  $p < 0.01$ ), and Somatization ( $r = 0.39$ ,  $p < 0.01$ ), as assessed by means of the Symptom Checklist-90—Revised (SCL-90-R; Prunas et al., 2010). The questionnaire revealed a satisfactory internal consistency (Cronbach's alpha = 0.71).

The results of the CSSQ scale validation study highlighted the presence of three significant factors, which the authors labeled as: 1) "Relationships and Academic Life," which comprised the four items covering perceived stress related to relationships with relatives, relationships with colleagues, relationships with professors, and academic studying; 2) "Isolation," which comprised the two items exploring perceived stress related to social isolation and changes in sexual life due to the containment measures; and 3) "Fear of Contagion," which comprised the item assessing perceived stress related to the risk of infection. Therefore, we decided to analyze any relationships between the increase in left bias and the stress measured through the CSSQ scale.

### Coping Orientation to Problems Experienced—New Italian Version (COPE-NIV; Sica et al., 2008)

The questionnaire consists of 60 items on a 5-point Likert scale ranging from 1 ("I usually don't do this at all") to 4 ("I usually do this a lot") divided into five subscales: Seeking

Social Support (12 items covering strategies centered on seeking support for instrumental or emotional reasons and focusing on and venting of emotions; Cronbach's  $\alpha = 0.88$ ), Avoiding (16 items covering strategies centered on detaching, denial, humor, alcohol and drug disengagement, behavioral disengagement, and mental disengagement; Cronbach's  $\alpha = 0.70$ ), Positive Attitude (12 items covering strategies centered on positive reinterpretation and restraint coping; Cronbach's  $\alpha = 0.76$ ), Problem Solving (12 items covering strategies centered on suppression of competing activities, planning, and active coping; Cronbach's  $\alpha = 0.83$ ), and Turning to Religion (8 items covering strategies centered on seeking comfort in religious and spiritual practices; Cronbach's  $\alpha = 0.85$ ).

## Procedure

### Pre-Lockdown Session (T1)

The first experimental session took place in a quiet room of the University of Naples Federico II. In the room, there was a large table with chairs around it; on the table, there were an 8-inch tablet to be used by participants and a computer in front of the experimenter. Participants sat in front of the experimenter. The total time to complete all tests was around 20 min.

The first session test battery we administered included, among other tests, the Cancellation task, the RAM task, and the Raven's APM task. The Cancellation task and the RAM task were administered by means of specific software running on an 8-inch tablet and performed using a stylus pen to interact with the screen. Participants were comfortably seated with a viewing distance of ~40 cm, and the tablet was placed on the table in front of them in a vertical position.

A digital version of the Raven's APM was first administered, for which the matrices were transposed on Google Modules. Participants used a 14-inch PC and a mouse to perform the APM. Then, the Cancellation task was administered on the tablet. The instructions were as follows: "As soon as you select the green button with the pen you will see little circles, which you will have to select all in the shortest possible time. If you happen to touch the white screen it will turn black for a moment, then you go on." Finally, the digitized RAM task was performed by participants. The instructions were as follows: "The objective of this task is to explore all the arms of the mazes, dragging the ladybug there, and find the ladybugs hidden under the jars within 60 s. Remember that you must always go to the center before moving from one arm to another. The first item is for practice."

### Lockdown Session (T2)

After about 2 months from the start of the lockdown, we contacted the participants of the first experimental session. A subgroup of 47 students agreed to participate in the second experimental session. The procedure consisted in the administration of the questionnaires, then in the online administration of the Cancellation task, and the digitized RAM task to the participants, through Microsoft® Teams, a unified communication and collaboration platform that combines chat, teleconferencing, content sharing, and application integration.

Participants were asked to fill out the questionnaires on Microsoft® Forms, an online survey maker software. A few

days after completing the questionnaires, one experimenter started the cognitive test sessions and carried out the online meetings on Microsoft® Teams platform, with each student separately. The experimenter first explained the test procedure methods, ensuring that both network connections were working properly. The software implementing the spatial tasks ran on the experimenter's computer. After giving the same task instructions as in the pre-lockdown session, the experimenter activated the Microsoft® Teams platform's screen sharing mode, so that the participants had the control of the experimenter's screen and were able to carry out the tasks. Thus, there were minor differences in user interface between T1 (touch stylus used for the Cancellation task and the RAM task) and T2, when the mouse was instead used for all tests.

## Parameters

In both the experimental sessions, the following parameters were analyzed.

For the Cancellation task, we first defined the center of the display as 0, so that the values of the X pixel coordinates assumed a negative sign for the left side of the screen and a positive sign for the right side. Then, we calculated the average position on the x-axis of the first canceled stimulus for each participant (see Gigliotta et al., 2017, for a detailed description of the procedure). In order to assess potential differences in spatial bias before (T1) and during (T2) the lockdown, we calculated the increment of leftward preference, in canceling the first stimuli, from T1 to T2.

For the RAM task, we defined as 0 the center of the display. The values of the X pixel coordinates were negative for the left side of the screen and positive for the right side. We focused on the performance on the 8-arm maze, which offered participants the largest number of potential exploration strategies. We assessed the coordinates of the first explored arm for the 8-arm maze, as well as the spatial sequence of the visited arms.

For Raven's APM, in addition to the test scores, we obtained a measure of position preference (see Costa et al., 1969), by assessing the location in space (left or right) of the error responses chosen below the target figure of each matrix. Therefore, we calculated the average number of items erroneously chosen for each side of space, among the four left-sided and the four right-sided alternatives.

## RESULTS

Data analysis was run on JASP (<https://jasp-stats.org/>), version 0.12.2.

### Cancellation Task

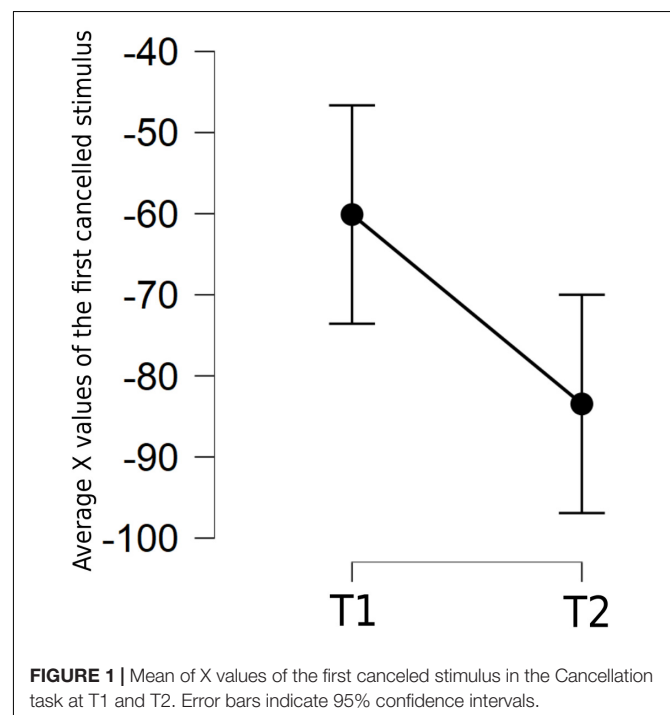
First, we investigated the presence of a lateralization of the first canceled stimulus in the Cancellation task: results showed a left-biased distribution of the first canceled stimulus both for T1 (Wilcoxon–Mann–Whitney two-tailed test,  $Z = -103$ ,  $p < 0.001$ ; mean =  $-60.1$ , SD = 62.33) and for T2 (Wilcoxon–Mann–Whitney two-tailed test,  $Z = -18$ ,  $p < 0.001$ ; mean =  $-83.46$ , SD = 49.97), thus confirming the previously reported tendency to

start the visual search from a left-sided target (pseudoneglect) on this task (Gigliotta et al., 2017).

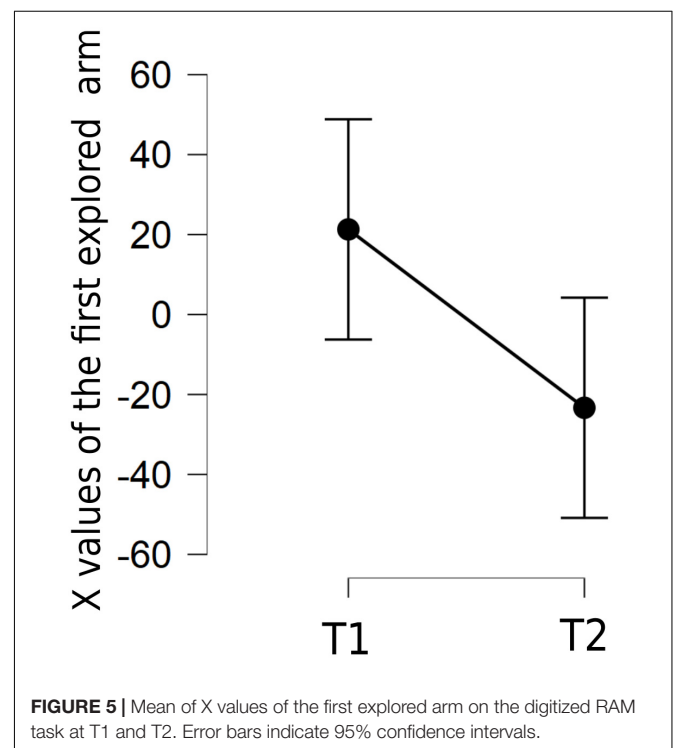
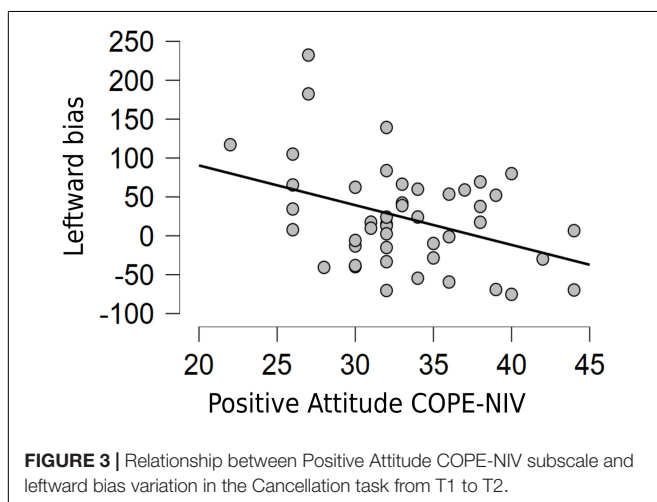
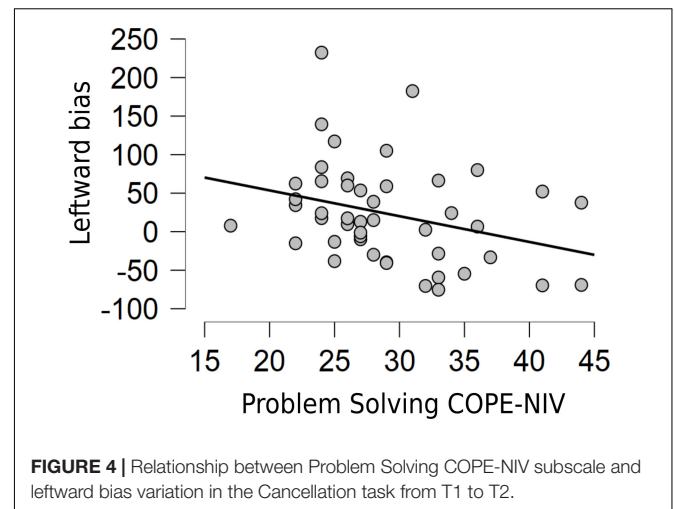
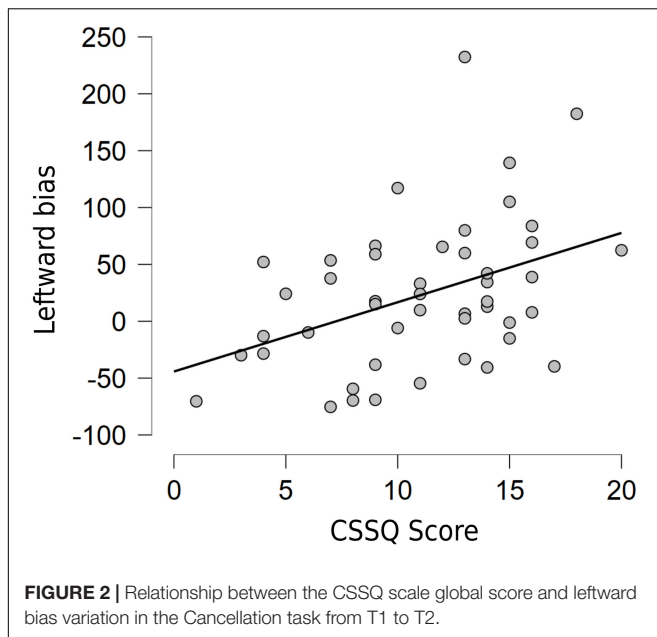
Then, a repeated measure ANOVA was conducted on the spatial X coordinates of the first canceled stimulus for each trial in T1 and T2, to evaluate potential lockdown-induced changes in patterns of spatial exploration. The independent variable was the time of testing (T1, T2); the dependent variable was the coordinate (in pixels) of the first canceled stimulus. **Figure 1** shows that, on average, the first canceled stimulus at T2 was 23 pixels further to the left (mean =  $-83.46$  pixels, SD = 49.97) as compared with its position at T1 [mean =  $-60.10$ , SD = 62.33,  $F(1,46) = 6.10$ ,  $p = 0.017$ , with a moderate sample size effect,  $\eta^2 = 0.117$ ].

To further assess the potential relationship between stress and magnitude of pseudoneglect, we conducted a two-tailed Pearson's correlation analysis between the results of the CSSQ and the pseudoneglect increment at T2 from T1. The null hypothesis was that the two variables are not related in our sample; conversely, the alternative hypothesis was that the stress and the magnitude of pseudoneglect are related. The results showed a significant correlation between the CSSQ scale and the leftward biased exploration of the space ( $r = 0.407$ ,  $p = 0.004$ ), so we could accept the alternative hypothesis and reject the null one: particularly, as stress levels increase, the exploration bias to the left seems to be also accentuated (**Figure 2**).

A second two-tailed Pearson's correlation analysis investigated the potential relationship between coping (assessed through the five subscales of the COPE-NIV) and pseudoneglect increment at T2. The results showed a significant correlation between 2 out of 5 COPE-NIV subscales (Positive Attitude and Problem Solving) and lower leftward biased exploration of the space





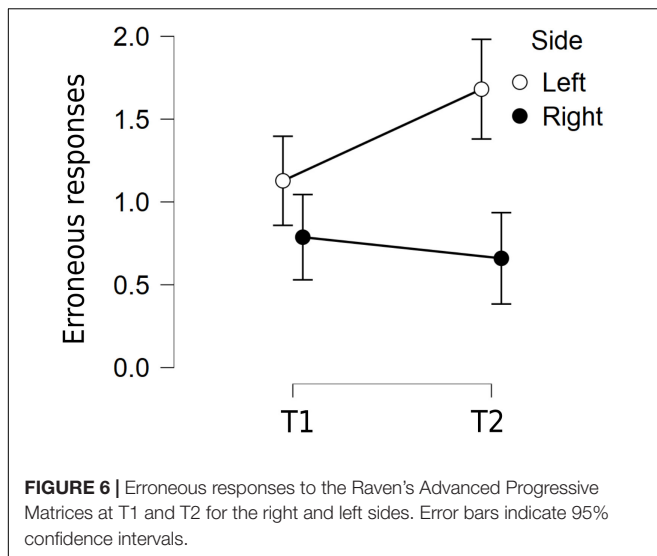


( $r = -0.385$ ,  $p = 0.008$  and  $r = -0.308$ ,  $p = 0.037$ , respectively; see **Figures 3, 4**). This correlation indicates that pseudoneglect decreases with increasing active coping strategies. Instead, no significant correlation resulted between the other COPE-NIV subscales, Seeking Social Support ( $r = 0.100$ ,  $p = 0.507$ ), Avoiding ( $r = -0.072$ ,  $p = 0.633$ ), and Turning to Religion ( $r = -0.116$ ,  $p = 0.445$ ).

### Digitized RAM Task

We investigated the lateralization of the first explored arm of the RAM and verified if there was a significant variability of the lateralization between T1 and T2. A repeated measures ANOVA on the x coordinates of the first arm (of the 8-arm maze) chosen indicated that participants tended to start exploration from a left-sided arm at T2 (mean =  $-23.04$ , SD =  $112.74$ ), whereas they preferred to start from a right-sided arm at T1 [mean =  $21.62$ , SD =  $110.47$ ,  $F(1,46) = 5.31$ ,  $p = 0.03$ ,  $\eta^2 = 0.103$ ] (**Figure 5**).

Then, to assess a potential relationship between stress/coping and the deviation of the maze exploration to the left side at T2, a two-tailed Pearson's correlation analysis between the results of the CSSQ/COPE-NIV and the laterality variation at T2 from T1 was conducted. The results do not show any significant correlation of the variation in lateralization, neither with the global score of the CSSQ scale ( $r = -0.173$ ,  $p = 0.246$ ) nor with the CSSQ subscale scores, nor with the 5 COPE-NIV subscales, such as Positive Attitude and Problem Solving coping strategies ( $r = -0.092$ ,  $p = 0.545$  and  $r = -0.019$ ,  $p = 0.899$ , respectively).



## Raven's APM

Participants obtained scores in the normal range both at T1 (mean = 10.085, SD = 1.851) and at T2 (mean = 9.745, SD = 1.750). There was no significant effect of time of testing on accuracy [repeated measures ANOVA on the correct answers,  $F(1,46) = 2.012, p = 0.163$ ].

To assess changes in position preference for erroneous responses (Costa et al., 1969), we conducted a 2 (period of testing: T1, T2)  $\times$  2 (error side: right, left) repeated measures ANOVA. There was a main effect of error side:  $F(1,46) = 22.41, p < 0.001, \eta^2 = 0.14$ , because participants showed a bias to choose a left-sided item (mean = 1.40, SD = 1.30) over a right-sided one (mean = 0.72, SD = 1.01). Time of testing approached significance ( $p = 0.06$ ), because participants tended to make more errors during quarantine (mean = 1.17) than before it (mean = 0.96). Importantly, the two factors interacted  $F(1,46) = 4.91, p = 0.032, \eta^2 = 0.036$ , because the leftward bias increased during quarantine (Figure 6).

Finally, to assess a potential relationship between stress/coping and the deviation of Raven's errors to the left side at T2, a two-tailed Pearson's correlation analysis between the results of the CSSQ/COPE-NIV and the laterality variation at T2 from T1 was conducted. The results do not show any significant correlation of the variation in lateralization, neither with the global score of the CSSQ scale ( $r = -0.017, p = 0.910$ ) nor with the CSSQ subscale scores, nor with the 5 COPE-NIV subscales, such as Positive Attitude and Problem Solving coping strategies ( $r = -0.148, p = 0.327$  and  $r = -0.079, p = 0.604$ , respectively).

## DISCUSSION AND CONCLUSION

The aim of this research was to assess whether the stressful conditions experienced by students during the harsh quarantine measures taken in Italy (a country strongly hit by COVID-19) had any influence on their spatial cognition abilities. The results indicated several indices of such an influence.

Specifically, we found a significant leftward shift in three tasks tapping on spatial abilities from T1 (pre-lockdown) to T2 (circa after 2 months of harsh quarantine). The tasks were (a) the Cancellation task, (b) the digitized RAM task, and (c) the Raven's APM task. Importantly, there were no changes in the general accuracy on the Raven's APM task, a test of general non-verbal intelligence; the only time-related change was an increase of leftward spatial bias in the choice of an (erroneous) response item. Thus, the time-related changes we observed seem to be relatively specific to the spatial domain. A potential confound could be the mode of response used for the Cancellation task. Participants used a touch pen at T1 and a computer mouse at T2. However, a similar increase in leftward bias with time also occurred on the Raven's matrices, where participants always responded by using the mouse.

Were these changes in spatial bias really related to lockdown-induced stress? Evidence supporting this possibility comes from (1) the positive correlation between stress measured through the CSSQ scale and the increase of pseudoneglect during the lockdown and (2) the negative correlation that we observed between the increment of pseudoneglect and specific active coping strategies, which mirrored the positive correlations between pseudoneglect and time of testing on the Cancellation task (for the other tasks, we should take into account differences on the cognitive functions they rely on and different measures of stress). Individuals who were able to resort to positive attitude and problem-solving coping strategies displayed lesser leftward bias than those who obtained higher scores in perceived stress.

Our findings seem, therefore, in line with research underlining the impact of perceived stress on individuals' performance (Matthews et al., 2000; Matthews and Campbell, 2009). They also provide new evidence supporting the efficacy of the adoption of strategies centered on activity and positive reappraisal (Santarnecchi et al., 2018; Zurlo et al., 2019).

The neurobiological underpinnings of physiological leftward bias (pseudoneglect) are likely to rely on hemispheric asymmetries of attention networks (Corbetta et al., 2008; Bartolomeo and Malkinson, 2019). Shifts in line bisection strictly depend on activity in these fronto-parietal networks (Thiebaut de Schotten et al., 2005). For example, activity in the right ventral attention network seems to correlate with the effect of line length in pseudoneglect (Benwell et al., 2014). In a simulation study, Gigliotta et al. (2017) demonstrated that different patterns of asymmetries in artificial attention networks can lead to different levels of pseudoneglect in neuroagents (robots provided with a simulated brain) performing a Cancellation task similar to the one used here.

On the other hand, abundant evidence suggests a relation of stress-related mechanisms with the right hemisphere (Compton et al., 2000; Ocklenburg et al., 2016; Bartolomeo and Malkinson, 2019). Moreover, early life exposure to stress has been proposed as a determinant of psychiatric and neurodevelopmental diseases characterized by atypical brain asymmetries (Berretz et al., 2020). Finally, a recent study on turning behavior in rats highlighted a leftward shift in turning preferences in a group of animals exposed to stressful conditions during the early stage of their lives compared with a control group (Mundorf et al., 2020).

Acute and chronic stress can thus affect lateralized behavior in humans and animals, as a result of higher right-hemisphere activation (Ocklenburg et al., 2016). In addition, stress in university students was found to increase connectivity in the attention networks, particularly in the right hemisphere (Soares et al., 2013). Over time, this functional modulation might translate into structural plastic changes. For example, Brem et al. (2020) performed white matter tractography on a group of volunteers after 520 days of confinement and found a general reduction in fractional anisotropy in the right temporo-parietal junction. Coping strategies, on the contrary, might be related to greater left hemisphere connectivity. Santarnecchi et al. (2018) found a positive correlation with the connectivity of the left angular gyrus of performance on the problem-solving subscale of the coping scale used in this study, the COPE-NVI.

The specific relation we found between stress and leftward bias is thus likely to depend at least in part on stress-induced increased activity of right-hemisphere attention networks. The right hemisphere may also facilitate stress hormone responses through the hypothalamic–pituitary–adrenal gland axis (Sullivan, 2004), whereas the left hemisphere structures, such as the medial prefrontal cortex, may increase resilience to stress and control its effects on social behavior (Lee et al., 2015).

The present study was conducted on a relatively limited participant sample ( $N = 47$ ). As a consequence of the strict lockdown measures, the test conditions could not be fully controlled at T2. Despite these limitations, our results linking stress and leftward bias were consistent over several tests. More “ecological” tests of spatial cognition, closer to everyday life activities than the tests we employed here (Cerrato et al., 2019, 2020), may be useful to further assess these relationships. Studies in animals, as well as on simulated neurorobots (Broz et al., 2014; Gigliotta et al., 2015a,b, 2017; Pacella et al., 2017), might further

illuminate the intimate mechanisms that link stress to spatial attention.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Local Ethics Committee of the University of Naples Federico II (protocol number: 12/2020). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

OG, LM, MZ, and PB contributed to the conception and design of the study. FS, FV, AA, and AC collected the data and wrote the first draft of the manuscript. OG performed the statistical analysis. All authors contributed to manuscript revision, and read and approved the submitted version.

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# Social, Family, and Educational Impacts on Anxiety and Cognitive Empathy Derived From the COVID-19: Study on Families With Children

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This research aims to monitor the current situation of confinement in Spanish society motivated by COVID-19 crisis. For this, a study of its socio-family, psychological and educational impact is conducted. The sample ( $N = 165$  families, 89.1% nuclear families with children living in the same household and 20.5% with a relative in a risk group) comes from the Aragonese region (Spain). The instruments used are: Beck-II Depression Inventory (BDI-II); Baron-Cohen and Wheelwright's Empathy Quotient (EQ) with its cognitive empathy subscale, as well as an ad-hoc questionnaire, reviewed by a panel of experts, to learn about socio-personal, family and housing conditions, use of technology, involvement in school tasks and household, and working condition. The multiple regression analysis results show that the anxiety derived from the current situation is explained in 23.1% ( $p < 0.001$ ) by the variables: gender ( $t = -2.31$ ,  $p = 0.022$ ), level of Internet consumption ( $t = 2.139$ ,  $p = 0.034$ ), increase of family conflicts ( $t = 2.980$ ,  $p = 0.003$ ) and help with school tasks ( $t = 2.980$ ,  $p = 0.040$ ). On the other hand, cognitive empathy is explained in 24.6% ( $p < 0.001$ ) by the variables: gender ( $t = -4.690$ ,  $p < 0.001$ ) and mother's hours of teleworking ( $t = 2.101$ ,  $p = 0.037$ ). All this leads us to conclusions related to preventive systems of social, psychological, and educational aspects to better serve families. These conclusions can be also be transferred to the future with an inclusive care to family settings from those three parameters.

**Keywords:** COVID-19, anxiety, cognitive empathy, families, education, social stressors

## INTRODUCTION

The current health emergency due to COVID-19 has led to numerous countries, and, above all, to Spain, to decree very drastic measures of house confinement (Gobierno de España, 2020). Life as it was known until now has been paralyzed. Only the work to produce essential services and products has been allowed and telework has prevailed over on-site work. All these measures have had an impact on people social, family, work, and educational life in the face of an unprecedented situation, which surely will have psychological and sociological consequences on the population, as well as changes in educational methods.

Recently, studies have been published that show how the COVID-19 pandemic is affecting the population health. The biopsychosocial model defends the need to attend not only to physiological symptoms (Guan et al., 2020; Holshue et al., 2020) but also to psychological and social elements such as: anxiety, depression, suicidal intentions, panic disorder, loneliness and psychotic signs (Moghanibashi-Mansourieh, 2020; Wang et al., 2020; World Health Organization, (WHO), 2020) caused both by the situation of isolation and by social consequences such as unemployment, inflation and closure of companies (Moghanibashi-Mansourieh, 2020). In his theoretical review Rajkumar (2020) shows the psychological consequences of this situation, highlighting how the incidence of anxiety and depression is increasing. Likewise, he argues the urgent need to implement specific interventions in vulnerable populations: children, adolescents and people with few resources. Although all age groups present at some extent psychological and social symptoms, age is a determining variable in the appearance and intensity of symptoms of psychological nature, and so is gender. In Iran, Moghanibashi-Mansourieh (2020) exposes how the level of anxiety in women is significantly higher than in men, also being higher in the group between 21 and 40 years old, predictably because this is the most economically affected group. Similarly, he indicates that the low level of education increases the anxiety rate, and, also, the continuous consumption of news related to the coronavirus. On the other hand, people who have relatives or acquaintances with COVID-19 are also severely affected by this type of psychopathology. Similarly, Wang et al. (2020) find that in China, women are the most affected in terms of psychosocial stress, anxiety and depression. It is necessary to contextualize anxiety and stress from the theory of family stress and coping theory (Patterson, 1988; Boss, 2001). In addition, these same authors, contemplate stress as a concept that is not always negative, and that obeys to the response of family adaptation in a communitarian and cultural context including factors or demands of normative and not thermal character, unresolved family tensions and small daily annoyances. Aligned with these studies, Taylor et al. (2008) recall how in the “flu epidemic” (pig flu) those people who lived in areas with a higher rate of cases suffered greater stress, being the youngest and less educated people the group with the highest risk of this disorder.

It is obvious that contextual elements play an essential role in anxiety control in situations of social isolation derived from natural, political or health emergencies, as is the case of COVID-19 crisis (Sugiura et al., 2020). In these situations, in addition to the main stressor, that is the crisis itself, authors such as Lock and Gordon (2012), add a series of secondary stressors derived from the family, social, economic, media or educational contexts that can aggravate these anxiety situations. These would be: economic stressors such as loss of income due to labor issues (Ehrlich et al., 2010; Picou and Hudson, 2010); stressors related to family or friends' health during the emergency (Kun et al., 2010); stress related to exceptional education and schooling in these situations (Kilmer and Gil-Rivas, 2010); stress derived from exposure to catastrophic information provided by the media (Lau et al., 2010); stressors related to the increase in family conflicts (Irmansyah et al., 2010), understood as the disputes

between parents, parents and children or among children that cohabitate (Emery, 1992), or greater burden on the distribution of household chores in some of the family members (McDermott, 2010); anxiety derived from the loss of social contact with friends and colleagues and, consequently, reduction of social capital (Wind et al., 2011); stress derived from loss of leisure and recreation (Irmansyah et al., 2010); and the anxiety related to changes in people's opinions about the world they live in or about themselves (Lock and Gordon, 2012) towards a greater perception of the democratization of risk (Beck, 1998). To these secondary stressors, the publication by Howard et al. (2018) adds in the family context the fact of caring for the elderly, people with disabilities, having children under five years-old, having low incomes and belonging to groups with cultural and linguistically diverse backgrounds.

On the other hand, the empathy is an important construct in humanitarian crisis. This concept is defined as: “empathy allows us to interact effectively in the social world” (Baron-Cohen and Wheelwright, 2004, p.163). In this sense, social support among group members is related to higher levels of empathy in these crisis situations and, therefore, lower levels of anxiety both in who helps and who is helped, regardless of the personality associated factors (Maner and Gailliot, 2007; Siedlecki et al., 2014; Sugiura et al., 2020). This is because, in crisis situations, the human being is eminently social and cooperative (Glassman, 2000), so prosocial behaviors in emergency situations are common and have a positive effect on the psychological well-being of members of the affected community (Afifi et al., 2012; Welton-Mitchell et al., 2016). This aspect is especially important in the present situation of confinement, since families must not only care for their children, but also other family members who are ill (Porzio et al., 2020) or with psychological disorders (Chatterjee et al., 2020), who are more vulnerable to the Covid-19.

Regarding educational elements related to staying at home, it is necessary to refer to research related to home-schooling in which the fundamental difference with the previous situation is the free and responsible option of being at home exercising educational functions with the social and psychological repercussions that this entails. Petrovic and Rolstad (2017) allude to the philosophical part of the idea that from home education autonomy and citizen commitment can be addressed, aspects that Rousseau and Freire highlight (Molina, 2002). Together with these ideas, the bottom line is freedom and knowing how to combine them and create synergies between the individual and the social (Gofen, 2015). Although it is difficult to conduct scientific studies related to this type of teaching due to its own idiosyncrasy, we allude to questions that appear in the reviewed works. The first is that making home schooling compatible, regardless of whether guidelines are followed, ends up having better emotional and academic results (Neuman and Guterman, 2016, 2017). Authors like DeRish et al. (2020) agree on the relevance of external evaluations to students so that monitoring is better for families and for apprentices. At this point it is necessary to remember the value of the evaluation as a way of considering the real situation and improvement guidelines. Although other studies such as Cheng and Donnelly's (2019) do not find significant differences in the emotional development

and socialization of children schooled at home or in educational centers. However, it is decisive to keep in mind that anxiety in mothers who attend school at home can have a negative effect on attachment (Zajac et al., 2020).

Reference has been made to this situation of real isolation (intentional and obligatory), highlighting the repercussion on families at the social, work and educational levels, and this has been linked to anxiety and empathy as outstanding variables. Thus, anxiety is understood as a transitory emotion characterized by subjective feelings of tension and apprehension, which are consciously perceived, accompanied by hyperactivity of the autonomic nervous system that can vary in intensity and over time (Spielberger et al., 1982). On the other hand, empathy is defined as an ability to perceive, understand and share emotions and stands out for its role in maintaining relationships and prosocial behaviors (Haut et al., 2019). Therefore, its importance for family coexistence in the current confinement situation is highlighted.

The objective of the current research is: to study the impact at psychological, educational and socio-familial level derived from the COVID-19 pandemic in families. That is to say, to analyze the different contextual variables and their impact on the states of anxiety and cognitive empathy in confinement. The following hypotheses are expected to be tested: different socioeconomic variables directly affect the states of anxiety and cognitive empathy (Maner and Gailliot, 2007; Siedlecki et al., 2014; Sugiura et al., 2020). In addition, it is expected to find that specific variables such as work situation, distribution of household tasks, care of people at risk and help to children in educational tasks are the variables with greater predictive weight for empathy and anxiety (Ehrlich et al., 2010; Irmansyah et al., 2010; Kilmer and Gil-Rivas, 2010; Kun et al., 2010; Lau et al., 2010; Picou and Hudson, 2010). Finally, it is expected to prove a gender difference in terms of empathy and anxiety produced by the change in the variables previously mentioned (Moghanibashi-Mansourieh, 2020).

## MATERIALS AND METHODS

### Sample

The sample is composed of 145 families from the Autonomous Community of Aragon (Spain), representing a total of 522 people, and with a family composition of 2 parents, or legal guardians with children, who respond the questionnaires. The average age of the adult participants is 42.52 (SD = 6.87) and 8.83 (SD = 6.32) for the children (Table 1). Of these, 32.4% had an only child, 63.9% two, and 4.7% three or more children. The selection was the result of a convenience and non-probabilistic snowball sampling on a national level, with a massive response from a single autonomous community (>90%), since the researchers belong to this region. The percentage of participation of families from other regions was very low (4.2%). Likewise, nuclear-type families exceeded 90% of the sample. It was decided to eliminate this data because it is not representative at a national level. The families excluded for not meeting the selection criteria represented 14.21% with a total of 87 individuals. The

**TABLE 1 |** Significant correlations of sociocultural variables and anxiety and cognitive empathy.

	Anxiety	Cognitive Empathy
Anxiety	1	0.183*
Cognitive Empathy	0.183*	1
Age	-0.257**	-0.182*
Gender	0.257**	0.399**
Number of children	0.004	0.166*
Children Ages	-0.167*	-0.186*
Father's employment status	-0.091	-0.196*
Garden/Terrace	0.169*	-0.037
Increase of time watching TV	0.166*	-0.021
Increase of time using the Internet	0.302**	0.091
Mother's hours teleworking	-0.002	0.236**
Time devoted to homework	0.229**	0.216**
Current help to children with school tasks	0.276**	0.251**
Past help to children with school tasks	0.163*	0.212*
Family conflicts	0.297**	-0.074
Household chores	-0.193*	0.024
Children's use of technological resources	0.101	0.171*
Assistance to other at-risk persons	-0.026	0.184*
Mother's help with school tasks	0.335**	0.238**
Father's help with school tasks	0.164*	0.157

\* $p < 0.05$ , \*\* $p < 0.01$ .

inclusion criteria were: (1) families belonging to the Community of Aragon, (2) families made up of 2 parents with children, (3) that they offer themselves (4) that the survey can be sent from the same address and in one go, and (5) that they send all the questionnaires duly completed. The questionnaires were completed during the first week of April 2020. The Spanish population was strictly confined for two weeks. It was measured at this time because we wanted to study the impact of this health measure, not its follow-up.

### Research Process

The study received the approval of the Ethics Commission of the University of Zaragoza acting under the guidelines of the Ethics Committee of the Autonomous Community of Aragon. To do that, several phases were conducted that began in March 2020. In the first, information explaining the nature and objective of the project was launched massively on trusted social networks related to the educational field: schools, institutes and universities, as well as an invitation to participate to all those families that were interested. In a second phase, those who had expressed their willingness to participate were contacted by signing the informed consent, while ensuring confidentiality and anonymity that respected the ethical procedures of the Declaration of Helsinki (World Medical Association, 2001). The third phase consisted of sending the questionnaires (composed by *ad hoc* socio-educational questionnaire, Beck Anxiety Inventory (BAI) and cognitive empathy subscale of the EQ empathy quotient scale) that they had to fill in online and anonymously. The responses were recorded on a digital data storage base for later exporting.



## Instruments

*Demographic and socio-educational questionnaire ad hoc*, of own elaboration. The questions were related to the type of family structure, number of children, type of home, profession, employment situation during the crisis, family conflicts, household chores, school homework, etc., It consists of 25 items and was evaluated by a panel of experts, reaching an almost perfect level of agreement ( $k > 0.81$ ) following the indications by Cohen (2013). Subsequently, to corroborate the conformity of the results, a post evaluation was established using an advisory council and following the criteria of the communicative methodology. With regard to the panel of experts, the level of agreement or concordance was calculated through the Kappa index, obtaining a value of 0.72 ("good" concordance force). A poor concordance is considered for values less than 0.20, weak of 0.21–0.40, moderate of 0.41–0.60, good of 0.61–0.80 and very good for values higher than 0.81. On the other hand, the internal reliability of the *ad hoc* survey was analyzed through Cronbach's Alpha index reaching values of 0.62, with moderate to high reliability.

*Beck's anxiety inventory (BAI)* in its Spanish adaptation by Sanz et al. (2005). It is designed for a collection of information in a self-report format that allows measuring the degree of anxiety and the aspects or symptoms less related to depression. Specifically, it measures anxiety derived from panic, panic and generalized anxiety disorders following the criteria established in the DSM-III-R. This questionnaire, dedicated to the measurement of cognitive and physiological anxiety consists of 21 items whose responses are evaluated from 0 to 3, being 0 "absolutely not," and 3 "severely." Reliability indices range from 0.41 to 0.58.

*Empaty Quotiente (EQ), Cognitive empathy scale* in its adaptation to the Spanish version (Redondo and Herrero-Fernández, 2018). The empathy quotient informs about the individual's ease and willingness to capture and understand other people feelings and how they are affected by these feelings of others. In this case, the study focused on cognitive empathy, so only this subscale was used. It consisted of 7 items, valued between 0 and 3, being 0 "absolutely not," and 3 "severely." Cronbach's alpha values for all subscales ranged from 0.67 to 0.80.

## Statistical Analysis

Statistical analysis was performed using the IBM SPSS Statistics for Windows software (version 25.0., IBM Cop., Armonk, NY, United States). First, a descriptive analysis of the socio-educational responses reported was performed. Its purpose was to describe the context of the current situation in qualitative terms. Subsequently, a comparison was obtained with the anxiety and cognitive empathy variables through analysis of variance (ANOVA). To establish the relationship between socio-educational factors and psychological factors of anxiety and cognitive empathy, a Pearson correlation analysis was carried out. To finish, a linear regression was performed to establish a predictive model of family and educational habits with the development of states of anxiety and empathy in the current situation of health crisis. All significant correlations were

included in the regression model considering a value of  $p < 0.05$  as statistically significant. On the other hand, linear regressions are carried out with steps forward. In this way, we can determine which element could be the most important.

## RESULTS

### Socio-Educational Comparative Descriptive Analysis

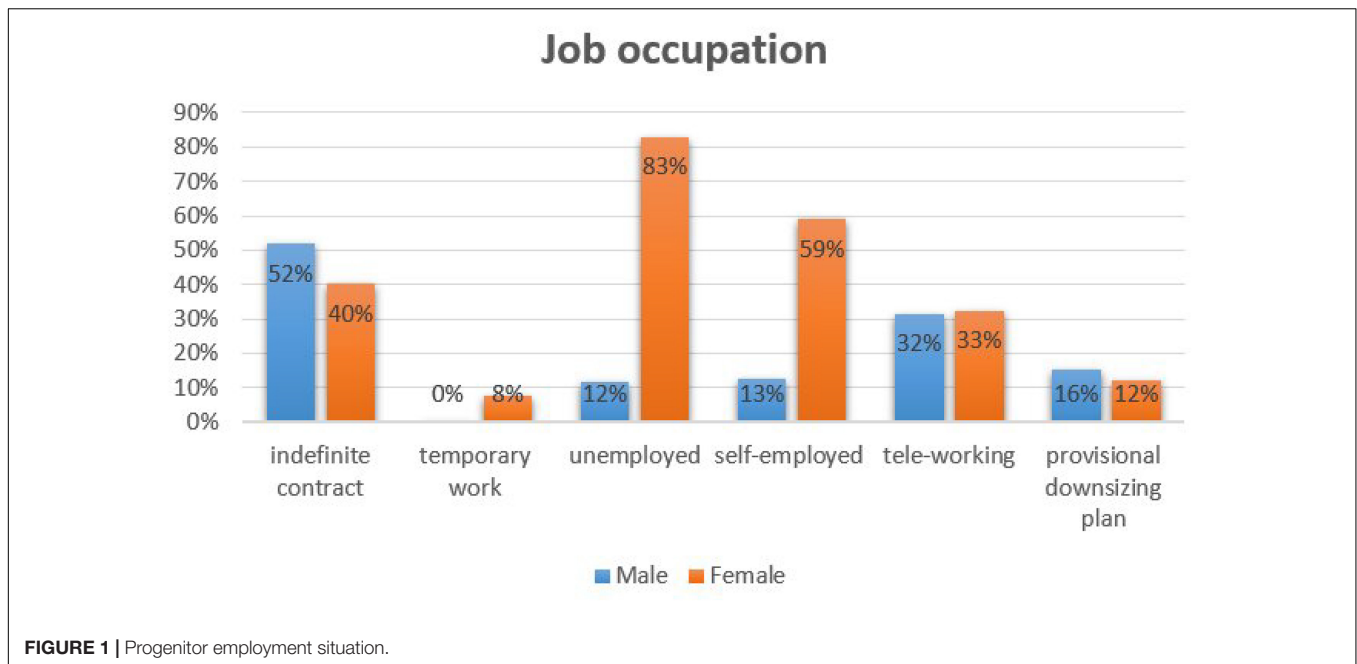
The qualitative analysis of the socio-educational questionnaire yields the following results: Regarding the parents' level of education, it is observed that mothers have university or postgraduate studies in a percentage of 65.7%, 30.8% have secondary studies, and 3.5% primary or basic studies. These data differ with respect to the fathers since 47% of them have university studies, 41.7% have secondary education studies and 11.3% elementary.

Regarding their **job occupation** (Figure 1), the females recognize that 40.2% of them have an indefinite contract, and males the 51.8% of them. Temporary work is performed by 7.7% of women. In the self-employed modality, women are 5.9% and men 12.5%. On the other hand, 8.3% of the females are unemployed compared to the males, which represents a 1.2% and finally 2.4% of them are retired. Regarding the profession, 26% of women are civil servants, compared to 19.6% of men, and 9.5% are engaged in household chores work, that in the case of the males are not reported. These differences between genders are evident when conducting a business activity, where there are no reported data on women, but on the male gender it represents the 4.2%. These observations raise again the debate on the wage gap and equality and equity between genders. Training data is higher for women, but the unemployment rate, unstable employment, and occupation in household chores account for 25.5% of them.

About the **current employment situation** in the confinement situation, the results are similar between the genders with respect to telework (32.5% women; 31.5% men) and those affected by a provisional downsizing plan (12.4% women; 15.5% men). There is a difference in attendance at the workplace, where 17.2% of women do so compared to 28% of men.

On the other hand, the **economic situation** of families in the state of health alarm has undergone some modification. 59.6% of them say that the family economy has been affected during this exceptional situation, with the negative situation being of a serious nature in 27.8% of households.

Arrangement the average scores of the BAI scale, the results derived from the first 15 days of confinement showed a greater presence of cognitive-subjective stress and anxiety in the individual. In this sense, the mean anxiety (Mean:13.9, SD:9.95) during the period of confinement was significantly higher than that which would be expected to be found in the population, according to BAI criteria (Sanz et al., 2005). In other words, anxiety rates skyrocketed. This cognitive determinant is what made the type of empathy focus on the cognitive character and reject the emotional element. The average rate was (Mean: 13.12, SD: 3.87) a superior value in normal conditions (Redondo and Herrero-Fernández, 2018).



Regarding the **size of the house and the existence of a garden or terrace**, 76.3% reported living in a dwelling larger than 76 square meters (21.9% < 105; 34.9% between 76–90 and 19.5% between 91–105) and 14.7% of families occupied smaller houses. In addition, 37.3% of families did not have a large garden or terrace, which increases the possibility of feeling anxiety and seeing empathic development altered. For this reason, an analysis of variance (ANOVA) was performed, showing that there was a difference in the empathy developed at this time in relation to the size of the dwelling ( $F = 3.047$ ;  $p < 0.05$ ). Thus, people living in a space less than 60 square meters are significantly affected by the development of their empathy, obtaining an average score of 9 compared to 13.406 of the overall average score. On the other hand, no significant differences were found regarding the repercussion of this variable on the development of anxiety. Regarding the variable of existence of garden or terrace in the home, the opposite occurs since there are no significant differences with empathy, but they exist in anxiety, when increasing the feeling of confinement ( $F = 4.228$ ;  $p < 0.05$ ), being greater in those families that don't have a terrace or garden ( $M = 15.463$ ).

The results on the **use of leisure time** during the alarm situation caused by the pandemic, indicate that 63.8% of respondents admit to having increased television consumption, with the increase in the Internet consumption becoming even more drastic, as it was reported by the 95.3% of the sample (general family), and 29.6% of them assuring that this increase has occurred severely. Given these response data, a new ANOVA analysis was carried out on these variables and their link with anxiety and empathic-cognitive development, finding a strong impact on the increase in internet consumption with respect to anxiety ( $F = 4.779$ ;  $p < 0.01$ ). Families who claimed not to have increased their Internet use or to have done it very slightly

reported mean anxiety scores of 7.285 compared to scores of 15.297 reported by those families who recognized a moderately high or severe increase of this consumption.

In the **educational field** and with respect to variables related to family hours devoted to children's school tasks, 50.3% of the families affirm dedicating less than 4 h to these tasks. 17.8% of them affirm that they are spending between 4 and 6 h, compared to 7.7% who report a daily dedication of more than 6 h. In contrast, 24.3% of families do not spend any time monitoring their children's homework. Differences in involvement between the maternal and paternal figure are observed. 41.7% of fathers claim not to help their children in the development of academic activities compared to 71% of mothers who do help their children. In addition, as a result of the current situation, family hours devoted to academic development of children has increased, going from 13% before the health crisis to 29.6% in the current situation, as they recognize helping in such tasks "always." This greater involvement and dedication, to the detriment of the enjoyment of free time, can trigger the increase of anxiety states and empathic development. An analysis of variance finds significant differences that point to the possibility of a significant increase in both anxiety and emotional empathy ( $F = 3.565$ ;  $p < 0.05$  and  $F = 3.114$ ;  $p < 0.05$ ) related to this increase in parental involvement.

As for the variables related to **family coexistence** such as the distribution of household chores and the evolution or stagnation of family conflicts in the current situation, in 32.5% of the families the mother is still in charge of carrying out these tasks, compared to 6.5% of the father. However, 61% of families recognize that in the current situation of confinement, the distribution of tasks is more equitable, with 36.7% affirming that the tasks are carried out by both parents or legal guardians and 24.3% that the tasks are carried out by all the members of the family. Regarding the

existence of family conflicts, 22.5% of the respondents report that they have increased and 27.2% of them that they have decreased. By linking these data with respect to the variables of anxiety and cognitive empathy, we found new differences in the ANOVA analysis, mainly with respect to anxiety ( $F = 6,276$ ;  $p < 0.001$ ), which increases in households where conflicts have intensified during the exceptional situation and decreases where tasks are equally distributed.

Finally, regarding the **existence of a person at risk** in the face of the health alarm caused by COVID-19 within the family nucleus, 20.7% of the respondents answered affirmatively, adding in 7.8% of the cases that these people also needed help. Another 27.8% of the sample had to attend someone at risk outside home. In this sense, an analysis of variance (ANOVA) determined the difference in terms of cognitive empathy with respect to this factor ( $F = 5.000$ ;  $p < 0.005$ ), turning out to be significant and establishing the increase in empathy in those who must assist people in risk at the present time. In contrast, no significant differences were found that affected the development of anxiety states.

## Correlational Statistical Analysis

To establish the relationship between socio-educational and psychological variables such as anxiety and cognitive empathy, a Pearson correlation analysis was performed (Table 1). A low positive significant correlation is found between these last two variables ( $0.183$ ;  $p < 0.05$ ). The results establish a significant negative correlation of anxiety and empathy with **age** ( $-0.257$ ,  $p < 0.01$ ;  $-0.182$ ,  $p < 0.05$ ), that is, the older the parents are, the lower the level of anxiety and empathy will be. **Gender** correlated significantly with anxiety ( $0.257$ ;  $p < 0.01$ ) and with empathy ( $0.399$ ;  $p < 0.01$ ), females have greater empathic capacity and greater anxiety. The **number of children** only correlates with empathy ( $0.166$ ;  $p < 0.05$ ), a higher number of children correlates with more empathy. In contrast, the **age of the children** correlates significantly and negatively with anxiety ( $-0.167$ ;  $p < 0.05$ ) and with empathy ( $-0.186$ ;  $p < 0.05$ ), the younger the children, the greater it is the parents' level of anxiety and empathy. The **father's occupation** only correlates significantly, low, and negative, with empathy. The higher father's employment status is, the lower level of empathy towards the members of his family. On contrary, **mother's hours of telework** presents a significant positive correlation with empathy ( $0.236$ ;  $p < 0.01$ ), indicating that the greater the number of hours teleworking, the greater her ability to empathize.

On the other hand, the time dedicated to **school tasks** by the children correlates significantly with anxiety ( $0.229$ ;  $p < 0.01$ ) and with empathy ( $0.216$ ;  $p < 0.01$ ). The same happens in the **assistance** provided by parents, at present time, to carry out these school tasks ( $0.276$ ;  $p < 0.01$ ;  $0.251$ ;  $p < 0.01$ ) and the help provided before the crisis ( $0.163$ ;  $p < 0.05$ ;  $0.212$ ;  $p < 0.05$ ). The difference is that the **mother's help** correlates significantly positively with anxiety ( $0.335$ ;  $p < 0.01$ ) and with empathy ( $0.238$ ;  $p < 0.01$ ), and **father's help** correlates only with anxiety ( $0.164$ ;  $p < 0.05$ ). Parental involvement an increase in parents' anxiety and, at the same time, empathy towards their children's feelings. In turn, the time spent helping their children increases

anxiety in the father and mother, but empathic development towards their children only occurs in the case of the mother. The variables of the existence of a **garden or terrace** in the home ( $0.169$ ;  $p < 0.05$ ), longer time watching **television** ( $0.166$ ;  $p < 0.05$ ) and increase in **internet** use ( $0.302$ ;  $p < 0.01$ ) only correlate with anxiety in a significantly positive way, being low for the first two, and moderate for the last one. On the other hand, **family conflicts** show a significant positive correlation with anxiety ( $0.297$ ;  $p < 0.01$ ). These variables pose a risk that negatively affects anxiety, altering family life. In contrast, the **children's use of technological resources** correlates significantly with empathy and in a low positive way ( $0.171$ ;  $p < 0.05$ ), which implies an increase in empathy between them. Another variable that affects family life is the performance of **household chores**. This variable correlates significantly and negatively with anxiety ( $-0.193$ ;  $p < 0.05$ ), that is, with less collaboration from others, anxiety increases in the person in charge of them. Finally, **assistance to other at-risk persons outside family home** correlates significantly and in a low way with empathy ( $0.184$ ;  $p < 0.05$ ). Therefore, assisting people at risk outside home increases empathic capacity.

## Statistical Regression Analysis

Two regression analysis were conducted using the method of successive steps forward. The first was based on a predictive model of anxiety due to socio-educational causes in the context of current confinement (Table 2). The second elaborates a predictive model for the development of cognitive empathy in the same circumstances (Table 3).

In the anxiety prediction model,  $R^2$  values of 0.211 were obtained, which means an explanatory capacity on the variance of 21.1%. The variables that were significant for anxiety caused by the current situation were gender ( $\beta = 0.186$ ;  $p < 0.05$ ), children's average age ( $\beta = 0.151$ ;  $p < 0.05$ ), mother's help with homework ( $\beta = 0.249$ ;  $p < 0.001$ ) and the increase of the Internet use ( $\beta = 0.252$ ;  $p < 0.001$ ) (Table 2).

## Regression Model for Predicting Anxiety

For the predictive model of cognitive empathy,  $R^2$  values of 0.274 were obtained, explaining the 27.4% of the variance. The significant variables for this model were gender ( $\beta = 0.377$ ;  $p < 0.001$ ), children's average age ( $\beta = 0.181$ ;  $p < 0.05$ ), help in the current situation with homework ( $\beta = 0.159$ ;  $p < 0.05$ ), mother's teleworking hours ( $\beta = 0.178$ ;  $p < 0.05$ ) and the fact of assisting other at-risk persons out of home ( $\beta = -0.185$  y  $p < 0.05$ ) (Table 3).

## DISCUSSION

The main findings of this research are that: anxiety derived from the pandemic situation is explained by gender, the level of Internet consumption, the increase in family conflicts and help with homework. Cognitive empathy is explained by gender and mother's teleworking hours.

The state of confinement has meant a new home structuring for families, becoming a place of work, upbringing, and care for

**TABLE 2 |** Regression model for predicting anxiety.

Model		Standardized coefficients	t	Sig.	95% confidence interval for B		VIF
		β			Lower limit	Upper limit	
1	Mother's help with homework	0.335	4.25	0	2.501	6.849	1
2	Mother's help with homework	0.303	3.955	0	2.112	6.334	1.015
	Increase of the Internet use	0.265	3.466	0.001	1.316	4.812	1.015
3	Mother's help with homework	0.277	3.629	0	1.758	5.964	1.038
	Increase of the Internet use	0.242	3.179	0.002	1.056	4.532	1.034
4	Gender	-0.176	-2.293	0.023	-7.006	-0.519	1.046
	Mother's help with homework	0.249	3.254	0.001	1.366	5.595	1.072
	Increase of the Internet use	0.252	3.341	0.001	1.189	4.637	1.038
	Gender	-0.186	-2.456	0.015	-7.215	-0.78	1.052
	Children's average age	-0.151	-2.004	0.047	-0.445	-0.003	1.038

**TABLE 3 |** Regression model for predicting cognitive anxiety.

Model		Standardized coefficients	t	Sig.	95,0% confidence interval for B		VIF
		β			Lower limit	Upper limit	
1	Gender	-0.399	-5.198	0	-4.814	-2.161	1
	Gender	-0.392	-5.269	0	-4.712	-2.141	1.001
2	Current help to children	24.	3.229	0.002	0.322	1.338	1.001
	Gender	-0.372	-5.029	0	-4.531	-1.974	1.016
3	Current help to children	0.221	2.996	0.003	0.26	1.27	1.015
	Mother's teleworking hours	0,163	2.185	0.031	0.051	1.023	1.03
	Gender	-0.366	-5.022	0	-4.464	-1.942	1.017
4	Current help to children	0.2	2.725	0.007	0.19	1.193	1.031
	Mother's teleworking hours	0.179	2.435	0.016	0.111	1.074	1.041
	Assistance to other at-risk persons out of home	-0.166	-2.27	0.025	-2.695	-0.186	1.025
	Gender	-0.377	-5.251	0	-4.536	-2.055	1.021
5	Current help to children	0.159	2.154	0.033	0.045	1.056	1.085
	Mother's teleworking hours	0.178	2.452	0.015	0.114	1.059	1.041
	Assistance to other at-risk persons out of home	-0.185	-2.565	0.011	-2.848	-0.369	1.037
	Children's average age	-0.181	-2.467	0,015	-0.197	-0.022	1.064

both children (Zhang et al., 2020) and sick relatives (Chatterjee et al., 2020; Porzio et al., 2020). This study describes the current family situation where parents, in a 50%, have had to opt for teleworking or they are affected by a provisional downsizing plan and all children continue their studies at home through the use of ICT. It is also evident that, regarding the level of studies and type or modality of parents' job, despite the fact that women have a higher level of education, they are also those who present the highest percentage in temporary jobs or unemployment. On the contrary, men are those who have indefinite jobs and conduct business activities. Regarding performing household chores and caring for people at risk, women still mainly do these tasks. These results are the consequence of a socio-cultural tradition that attributes stereotype and static roles based on gender (Blossfeld and Kiernan, 2019; McDermott et al., 2019). Regarding the variables that affect family life, the economic situation has been affected in more than the 50% of households, and television and internet consumption has increased as an alternative to outdoor

leisure. On the other hand, it is shown that most of the respondents lived in houses of less than 76 square meters, but only a third of them did not have a garden or terrace. Regarding family conflicts, there is no unanimity, since, in the same proportion, they indicate that they have increased as well as decreased (between 20 and 25%), therefore it is inconsistent with studies that indicate that this type of situation generates stress that causes an increase in family conflicts (Irmansyah et al., 2010).

**Anxiety** is one of the main consequences of the COVID-19 pandemic, with the **females** and **young adults** being especially vulnerable (Moghanibashi-Mansourieh, 2020; Rajkumar, 2020; Wang et al., 2020). In this sense, older age means better crisis management (Kang, 2014), being data that are aligned with our results. To the above we must add that the lack of a garden or terrace that supposes a greater feeling of confinement, the increase in hours watching the television as an alternative to outdoor activities, dedicating more hours to carrying out school tasks and helping children with them (to a lesser extent by



fathers), and an increase in family conflicts, lead to intensification of anxiety levels in confined persons. These data are in line with those provided by Lock and Gordon (2012) since the crisis situation is aggravated by effects derived from the family context and with those by Irmansyah et al. (2010) related to the loss of hours of leisure and outdoor recreation. On the other hand, the **predictive model** exposes that not only **gender** is an explanatory element, since there are other contextual and socio-family elements that can significantly affect stress and anxiety in this type of situation, as suggested by Sugiura et al. (2020). For example, the **children's average age** (the younger they are, the higher parents' anxiety levels), **mother's help in school tasks** and increase in the **use of Internet** are factors that also influence the development of states of anxiety in the current situation. These elements are aligned with previous research, in which pointed out as stressors we find: having children under 5 years-old (Howard et al., 2018), exceptional education and schooling in these situations (Kilmer and Gil-Rivas, 2010), or the unequal distribution of household chores (McDermott, 2010). Regarding the role of the Internet in this process, it is necessary to reference how its remarkable growth has been paired with alarming figures of addiction worldwide, and its consequences in the increase of depression and anxiety (Cheng and Li, 2014; Al Mamun and Griffiths, 2019; Lozano-Blasco and Cortés-Pascual, 2020). The Internet is the key to a new environment where a multitude of activities are carried out, from shopping to establishing affective relationships (Király et al., 2015) and in a confined environment, networks offer the maintenance of lost daily life: work, consumer goods and services, or attending to the education of children. Although, it should be borne in mind that norm-typical human behavior can be altered by its continuous interaction in the cloud (King et al., 2013; He et al., 2017).

On the other hand, the highest levels of **empathy**, in crisis situations, are related to the greater support among the members of the family unit, which is generated especially in those who carry out a greater proportion of help, work or assistance (Siedlecki et al., 2014). In these types of situations, a positive effect arises in those with the highest cooperative commitment (Glassman, 2000). In this sense, the results obtained in this research coincide with these previous studies since, as indicated above, being mother, having younger children, as well as their number, mother's teleworking hours, time helping with school tasks (especially for the mothers), having technological resources and assistance to people at risk outside home, are positively associated with empathy. The **predictive model** indicates that cognitive empathy is modulated by gender (greater empathy in women), the average age of the children (the younger the children, the greater the empathy), current help with school tasks, assistance to people at risk outside home and mothers' hours of teleworking, variables that increase these levels of empathy. Empathy within parental relationships is explained by the strength of the relationship between them and by the generation of response to affective states, being in full agreement with research such as the one by Eisenberg and Miller (1987) and Verhofstadt et al. (2008). On the other hand, it has sometimes been found that the level of education predicts the level of empathy (Haut et al., 2019) and in the present study it has already

been pointed out that the sample formed by females had higher academic levels than males.

In relation to the first two variables, gender and age of the children, there would be a correspondence with the levels of anxiety, since, as specified, the fact of being a woman and having younger children increases anxiety (Howard et al., 2018; Moghanibashi-Mansourieh, 2020; Rajkumar, 2020; Wang et al., 2020), but empathy also increases with these variables, explaining the correlation established between both variables of anxiety and empathy. Regarding the variables related to help or collaboration with others, assistance to other people-at-risk outside home and the help to children with school tasks are key factors in modulating cognitive empathy, so that it is increased in these situations, but almost exclusively in females. In this sense, although authors such as Maner and Gailliot (2007), Porzio et al. (2020), Siedlecki et al. (2014), and Sugiura et al. (2020) point out that assisting family members can be a major stressor in emergency situations (also in the case of our study, where the mother's school help was also an anxiety factor), in general, publications on this matter have been focused on how the social support network (family, friends, community members) is an element of great relevance when managing stress situations derived from different types of crises. These two examples of prosocial behaviors, common in emergency situations (Afifi et al., 2012; Welton-Mitchell et al., 2016), are a factor promoting empathy and cooperative spirit in the face of adversity (Zakour and Gillespie, 2012; Kim and Zakour, 2017). In other words, the human being has the ability to increase his cognitive empathy in the moments of greatest need in crisis situations (Glassman, 2000), seeking the psychological well-being of the group (Afifi et al., 2012; Welton-Mitchell et al., 2016) having a positive effect on both the person helping and the person being helped (Maner and Gailliot, 2007; Siedlecki et al., 2014, Sugiura et al., 2020). This last element is verified in our study in the increase of empathy when helping children in school tasks. Lastly, the mother's hours of teleworking seem to be an element that promotes empathy, and can be related to the fact of not having lost a job and having a greater ease of reconciling work and personal life in an emergency situation, being aligned with studies such as those by Ehrlich et al. (2010), Howard et al. (2018), and Picou and Hudson (2010).

Regarding the limitations of the study, the urgency of the situation, the sampling method, and the reception of a majority response from only one region in Spain can cause the sample to be slightly biased. However, the results present optimal indicators and seem to be aligned with the literature (Glassman, 2000; Maner and Gailliot, 2007; Afifi et al., 2012; Siedlecki et al., 2014; Welton-Mitchell et al., 2016; Sugiura et al., 2020). Regarding prospective, a repetition of the study once the period of confinement has ended and the population will adapt to the new normality, would serve to verify whether this crisis has changed the socio-family dynamics and the levels of empathy and anxiety of the population.

We consider what response we give from education, science, and society to attend these moments of emergency and that are linked to normative or cultural elements. It would have to be transversal, regardless of the moment in which one lives, empathy

towards the complex situations of other people, the search for emotional balance, compassion and actions linked to justice and social well-being. In and after this crisis, we can take many positive aspects to implement in families and in society, such as knowing how to work as a family team, respecting emotional singularities and looking for the contagion effect to the rest of social areas. An example of this is the [librosqueunen.org](http://librosqueunen.org) project in which a bond is created with the family in a situation of educational disconnection due to the digital divide. It has been proven that we are able to increase our empathy and regulate our anxiety, although we need more formal and non-formal education in this line, taking into account all the factors that are included in a family, and that are not only the family members or the "school inside the house" elements, but also the technological, media and social networking sites.

## CONCLUSION

With this research we approach the current situation of confinement in Spanish society motivated by COVID-19 crisis. For this, a study of the social, psychological, and educational impact on families is conducted. Undoubtedly, the results highlight the inequalities that still exist within the family sphere. Derived from our data, we could hypothesize that the mother figure continues to bear the burden of work at home and she is the sustenance that maintains family relationships and harmonious coexistence. The father figure continues to establish his work relationships as a priority, occupying a secondary place in the relationship with children and adults. Anxiety increases in strange situations in this context and empathy, especially by females, dampens the stress caused. Although authors such as Howard et al. (2018) and Sugiura et al. (2020) list a greater variety of stressors related to the personal, family, social and work environment than those identified in this study, the uniqueness of the global emergency situation caused by the COVID-19 crisis, justifies that the assimilation of this situation to other previous emergencies is not possible. Although many

of the studies collected in this research analyze exceptional situations (health emergencies, natural disasters, socio-political conflicts), the characteristics and global nature of this crisis places us in a new scenario, in which the truths assumed up to now are questioned. As Beck (1998) stated in the current Risk Society these new threats, derived from human action, shake the central components of society, motivating a series of debates and reformulations that science and society must jointly explore.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by CEICA (Comité Ético de Investigación Clínica en Aragón) del Gobierno de Aragón and Universidad de Zaragoza (ACUERDO de 2 de abril de 2020, del Gerente de la Universidad de Zaragoza, por la que se aprueba el Tratamiento de datos personales "Monitorización del Covid-19: Impacto social, psicológico y educativo"). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

AQ-R coordinated the design and research process. AQ-R and RL-B designed the psychological research. TÍ-B designed the sociological questionnaire. AC-P the educational one. AQ-R and RL-B carried out the statistical analysis. RL-B, AC-P, and TÍ-B carried out the theoretical framework, discussion and conclusion. All authors contributed to the article and approved the submitted version.

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# Neuropsychiatric and Cognitive Sequelae of COVID-19

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Coronavirus disease 2019 (COVID-19) is likely to have long-term mental health effects on individuals who have recovered from COVID-19. Rightly, there is a global response for recognition and planning on how to deal with mental health problems for everyone impacted by the global pandemic. This does not just include COVID-19 patients but the general public and health care workers as well. There is also a need to understand the role of the virus itself in the pathophysiology of mental health disorders and longer-term mental health sequelae. Emerging evidence suggests that COVID-19 patients develop neurological symptoms such as headache, altered consciousness, and paraesthesia. Brain tissue oedema and partial neurodegeneration have also been observed in an autopsy. In addition, there are reports that the virus has the potential to cause nervous system damage. Together, these findings point to a possible role of the virus in the development of acute psychiatric symptoms and long-term neuropsychiatric sequelae of COVID-19. The brain pathologies associated with COVID-19 infection is likely to have a long-term impact on cognitive processes. Evidence from other viral respiratory infections, such as severe acute respiratory syndrome (SARS), suggests a potential development of psychiatric disorders, long-term neuropsychiatric disorders, and cognitive problems. In this paper, we will review and evaluate the available evidence of acute and possible long-term neuropsychiatric manifestations of COVID-19. We will discuss possible pathophysiological mechanisms and the implications this will have on preparing a long-term strategy to monitor and manage such patients.

**Keywords:** coronavirus disease 2019, neuropsychiatric disease, cognition, depression, mental health

## INTRODUCTION

Coronaviruses are single-stranded RNA viruses, which caused two well-known outbreaks: (1) severe acute respiratory syndrome (SARS) in 2002 and (2) Middle East respiratory syndromes (MERS) in 2012. Since December 2019, several cases of atypical pneumonia have been reported from Wuhan, China. A novel coronavirus was identified to be the cause and was subsequently named by the WHO as: “severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).” It is well known that coronaviruses affect the respiratory tract, with most patients experiencing only mild symptoms akin to the common cold (e.g., blocked/runny nose, headaches, sneezing, a raised temperature, loss of taste and smell, etc.) and the illness is self-limiting. However, if the virus reaches lower respiratory tract, in

vulnerable individuals such as new-born, elderly, and immunocompromised, it can cause severe illness such as pneumonia, bronchitis, exacerbation of asthma, chronic obstructive pulmonary disease (COPD), and acute respiratory syndrome (ARS), as seen in SARS, MERS, and now COVID-19 (Desforges et al., 2014; Raj et al., 2014). Unfortunately, coronavirus is an opportunistic virus and can allude immune response, potentially spreading to cells other than the respiratory tract's epithelial cells. Several coronaviruses have shown to be neuro-invasive, including SARS and MERS (Gu et al., 2005; Xu et al., 2005; Arabi et al., 2015).

As of the 28th of June 2020, SARS-CoV-2 has now infected over 10 million people worldwide (Dong et al., 2020) and the pandemic continues to grow. The disease caused by SARS-CoV-2 is known as corona virus disease 2019 (COVID-19), which manifests not just as a respiratory illness but also impacts the cardiovascular, renal, and the nervous system functions (Yuki et al., 2020). It is known from previous pandemics, such as Spanish influenza and SARS, that there are not just acute effects of the viral infection but also long-term sequelae due to disease itself as well as social effects due to governmental measures of containment such as quarantine, social distancing, and lockdown.

In this paper, we aim to present an understanding of pathophysiology, possible effects of SARS-CoV-2 infection to the brain and its long-term neuropsychiatric and cognitive consequences. Understanding neuropsychiatric and cognitive consequences are important, as millions of individuals have been affected; many more are undetected, and the number of infections is still rising. If even a fraction of such individuals experience neuropsychiatric complications, the public health implications could be considerable. Therefore, it is important to understand the neuropsychiatric and cognitive consequences of COVID-19. In this paper, we will briefly outline how COVID-19 can affect the central nervous system (CNS), review emerging evidence of effects on CNS and explore the possible neuropsychiatric sequelae of the COVID-19 infection. We will discuss diverse neuropsychiatric and cognitive complications following COVID-19 infection, possibly affecting a large proportion of individuals previously suffering from COVID-19. This, in turn, could lead to a potential increase in patients with psychiatric and cognitive problems. Understanding and assessing cognitive consequences following COVID-19 is important as it could be used to estimate an individual's capacity to work effectively, drive, manage finances, participate in daily family activities, or make informed decisions. Appropriate neuropsychological rehabilitation could be planned to remediate or compensate for cognitive deficits in COVID-19 survivors.

Neuropsychiatric consequences are neurological, psychiatric, and cognitive problems due to direct brain damage, disease, or indirect effects on the CNS *via* an immune response or medical therapy (Rogers et al., 2020). The acute psychiatric manifestations of COVID-19 reported in surveys are increased stress, anxiety, and depression (Asmundson and Taylor, 2020). In the long-term, psychiatric presentations could also be affected by the outcome of their illness, stigma or memories,

and amnesia associated with the critical care they receive (Jones et al., 1998). Acute neurological symptoms such as headache, altered sensorium, acute cerebrovascular incidents, convulsions, and ataxia have been reported in more than a third of hospitalized patients (Mao et al., 2020). Reports of acute cognitive complications such as attention and dysexecutive symptoms are also emerging (Rogers et al., 2020; Varatharaj et al., 2020). However, we can just speculate about the long-term neuropsychiatric and cognitive consequences of COVID-19.

## **PATHOPHYSIOLOGY OF NEUROPSYCHIATRIC AND COGNITIVE CONSEQUENCES OF COVID-19**

SARS-CoV-2 is a novel virus and its pathophysiological mechanism on various physiological systems is yet to be fully understood. However, a lot can be learnt from other subtypes of coronaviruses. Coronaviruses primarily affect upper respiratory tracts, but they have been detected both in the brain and cerebrospinal fluids of the infected individuals (Bohmwald et al., 2018). There are several mechanisms through which coronaviruses can damage the nervous system. These may include direct infection injury, virus entering through blood circulation pathway, neuronal pathway, hypoxic injury, immune injury, and *via* binding to the angiotensin-converting enzyme 2 (ACE2). The neurotropic capacities of coronaviruses allow them to evade the immune response of the host and achieve latency. This makes them a potent factor to cause acute and late neurological effects. Although early indication shows that the expression of SARS-CoV-2 in the brain deviates slightly compared to SARS-CoV-1 and MERS expression, it is still a potential source for causing short and long-term neuropsychiatric and cognitive complications. For a detailed discussion of these mechanisms, please see Wu et al. (2020). The neuronal pathway *via* the olfactory nerve and role of ACE2 has been observed to be the primary pathophysiological mechanisms contributing to neuropsychiatric and cognitive complications in COVID-19 (Mirfazeli et al., 2020; Pantelis et al., 2020). This is mainly because coronaviruses affect the respiratory tract and can reach the ACE2-enzymes in the respiratory epithelial cells, and the olfactory nerve, providing a pathway for the coronavirus to enter the CNS.

### **Neuronal Pathway**

Neurotropic viruses, such as coronaviruses, use sensory and motor neuronal pathways to enter the CNS. One example of a neuronal pathway is the olfactory nerve (Desforges et al., 2019). This is mediated by the unique organization of olfactory nerves and the olfactory bulb in the nasal cavity and forebrain. The virus thus can reach the brain and CSF, which can cause inflammation and a demyelinating reaction. If the infection is set, then the viruses can reach the whole brain and CSF in less than 7 days (Bohmwald et al., 2018). Altered olfaction and gustatory problems (anosmia, hyposmia, and ageusia) have

been reported in 49% of COVID-19 patients (Hornuss et al., 2020; Vaira et al., 2020) implicating the possibility of CNS infection through the olfactory neuronal pathway.

## ACE2 and Its Role in Neuropsychiatric Complications

ACE2 enzyme is widely present in various organs including oro-nasal, respiratory, cardiovascular, cerebrovascular, and immune systems. The high density of ACE2 in oro-nasal mucosa and their binding with SARS-CoV-2 may account for olfactory symptoms of anosmia in COVID-19 (Lechien et al., 2020). Coronaviruses directly bind to ACE-2 receptors in respiratory epithelial cells cause cytokine storm, which causes widespread inflammation in patients with COVID-19, leading to multiple organ damage and immune-mediated encephalopathy manifesting as delirium and convulsions. Neuroinflammation is a well-recognized mechanism for the development of psychiatric disorders (Yuan et al., 2019). It can also cause hypercoagulable states causing ischaemic stroke besides other vascular events (Fotuhi et al., 2020). ACE2 plays an important role in controlling blood pressure but binding to SARS-CoV-2 can cause an increase in blood pressure, which can increase the propensity to cerebral hemorrhage. This may also explain the increase in mortality in patients with COVID-19 with comorbid metabolic conditions such as hypertension, high body mass index and diabetes (Fang et al., 2020). It has also been proposed that the spike protein of SARS-CoV-2 can bind to ACE2 receptors in capillaries, breaking the blood-brain barrier and allowing the virus to enter the brain directly (Wu et al., 2020). Neurons have a high density of ACE-2 and high binding to coronaviruses if they cross the blood-brain barrier. SARS-CoV-2 can lie latent in the neurons of patients who recover from acute effects of COVID-19, increasing the risk of long-term consequences by causing demyelination and neurodegeneration (Lippi et al., 2020).

## NEUROPSYCHIATRIC AND COGNITIVE EFFECTS OF CORONAVIRUS INFECTION

### Acute Effects

In the short-term, 20–40% of COVID-19 cases may present with neuropsychiatric complications, such as cerebrovascular events, headache, dizziness, encephalopathies, anosmia, ageusia, and mood problems (Bo et al., 2020; Crunfli et al., 2020; Lu et al., 2020; Mao et al., 2020; Mirfazeli et al., 2020; Troyer et al., 2020; Varatharaj et al., 2020; Wu et al., 2020; Zhang et al., 2020), see **Table 1**. The acute effect of CoV infections on the CNS is manifested in viral encephalitis, infectious toxic encephalopathy, and acute cerebrovascular disease. In a recent meta-analytic review, Rogers et al. (2020) reported the neuropsychiatric short- and long-term consequences of SARS and MERS infection. They reported that during the acute illness, 27–41% of cases had neuropsychiatric symptoms such as confusion, depressed mood, anxiety, impaired memory, and insomnia. Steroid-induced mania and psychoses were also reported. The meta-analysis also looked at the available data related to COVID-19 infection and neuropsychiatric consequences and found that confusion and agitation were present in 65–69% of the intensive care unit patients. Importantly, at discharge, 33% of the patients with COVID-19 had dysexecutive syndromes. Similarly, in a United Kingdom wide surveillance study, 153 patients were reported to have neurological and neuropsychiatric complications following COVID-19 infection (Varatharaj et al., 2020). Twenty-one of these cases developed a new diagnosable psychiatric disorder. The other noteworthy observation was the effect of age on altered mental status and cerebrovascular incident. Thirty-seven patients had altered mental status and 49% of these patients were younger than 60 years. However, of 74 patients who presented with cerebrovascular incidents, 81% of the patients were aged over 60. In another report, Mao et al. (2020) reported

**TABLE 1** | Percentage of COVID-19 patients showing neuropsychiatric and cognitive effects.

Reference	COVID-19 patients showing neuropsychiatric and cognitive effects							
	CNS <sup>1</sup>	PNS <sup>2</sup>	Affective disorders	Anxiety	Fatigue	PTSD	Impaired attention	Impaired memory
Short-term								
Bo et al., 2020						96%		
Crunfli et al., 2020			20%	28%			45%	28%
Lu et al., 2020	25%	35% <sup>a</sup>	42%		27%			13%
Mao et al., 2020	53%	19%						
Mirfazeli et al., 2020	40%	36% <sup>b</sup>						
Varatharaj et al., 2020	62%		17%					26%
Zhang et al., 2020			29%					
Long-term							0.57SD <sup>c</sup>	
Hampshire et al., 2020								
Lu et al., 2020	10%	22%	17%		7%			28%
Woo et al., 2020			11%		17%		44%	50%

<sup>1</sup>Central nervous system (CNS) includes dizziness, headaches, mental state, ataxia, seizure, and acute cerebrovascular disease.

<sup>2</sup>Peripheral nervous system (PNS) includes an impaired sense of smell, taste, vision, and nerve pain.

<sup>a</sup>A count of PNS symptoms occurring, it is possible a single patient had multiple symptoms.

<sup>b</sup>Average of reported PNS symptoms.

<sup>c</sup>Significant SD away from the healthy control group, indicating cognitive impairments for groups with different levels of medical assistance, the value here is the SD for patients requiring hospitalization with a ventilator.

neurologic manifestations of COVID-19. The study had 214 patients with mild to severe COVID-19 infection. Around 36.4% of the patients showed neurologic manifestations involving the CNS, peripheral nervous system (PNS) and skeletal muscles. These neurologic manifestations were more prevalent in patients with a severe infection and included signs of impaired consciousness and acute cerebrovascular diseases. Autopsy results have indicated degenerated neurons and an increased blood flow to some regions together with edematous brain tissue (Mao et al., 2020).

Structural brain abnormalities have also been reported with SARS-CoV-1 and MERS infections. In an MRI study looking into the post-infectious neurological consequences of MERS in three patients with severe neurologic syndrome found hyperintensities in the white matter of the parietal lobes, temporal lobes, frontal lobes, basal ganglia, and corpus callosum (Arabi et al., 2015). The neurological manifestations shown by these patients included: altered mental status (ranging from confusion to coma) ataxia, and focal motor deficits. Similarly, a study investigating autopsies of six SARS patients found evidence of edema and scattered red degeneration of the neurons (likely the result of neuronal hypoxia or ischemia), after finding evidence of SARS genome sequences in the hypothalamus and cortex (Gu et al., 2005). Structural brain abnormalities have been reported in COVID-19 patients too. Montalvan et al. (2020) have reported cases with brain abnormalities present in the bilateral thalamic, medial temporal lobes, hippocampus, and insular regions.

As reported by Helms et al. (2020), there are some findings of encephalopathy and reduced blood flow in the frontotemporal brain region following a COVID-19 infection. The extent to which COVID-19 infection leads to neurological damages and neuronal symptoms is currently still unknown. However, several studies have found patients with neurological diseases ranging from encephalitis to strokes (Mao et al., 2020; Moriguchi et al., 2020). Encephalitis alone is linked to an increased risk of a range of long-term sequelae such as epilepsy, bipolar disorders, psychotic disorders, anxiety disorders, cognitive problems, and dementia (Granerod et al., 2017).

## Long-Term and Chronic Neuropsychiatric Sequelae

It is known that the neural and immune cells can host latent CoV which could contribute to delayed neurologic and neuropsychiatric complications (Desforges et al., 2019). However, long-term neuropsychiatric sequelae of COVID-19 are currently unknown. We can speculate long-term effects from our understanding of the mechanisms of the COVID-19 on the CNS and evidence from long-term neuropsychiatric effects of SARS-CoV-1 and MERS. Lam et al. (2009) reported that 55% of survivors of SARS-CoV-1 had post-traumatic stress disorder (PTSD). Furthermore, depression was in 39%, pain disorder in 36.4%, panic disorder in 32.5%, and obsessive-compulsive disorder in 15.6% of SARS-CoV-1 survivors. In their meta-analytic review, Rogers et al. (2020) also reported long-term neuropsychiatric consequences of SARS and MERS infections in 10–20% of the cases, such as depressed mood,

insomnia, anxiety, irritability, memory impairment, and fatigue. However, it is important to understand that the neuropsychiatric manifestations, such as PTSD, depression, or anxiety, following COVID-19 infection could also be a psychological reaction to being infected, being in intensive care unit or experiencing stigma of contracting the infection.

If similar proportions of long-term neuropsychiatric complications emerge following COVID-19, then we can expect a crashing wave of neuropsychiatric sequelae (Troyer et al., 2020), which will have huge implication for management of the stretched healthcare resources in every country. Besides the neuropsychiatric sequelae, long-term implications will be observed with many neurological problems. For example, loss of smell is considered one of the hallmark symptoms of COVID-19 infection implying CNS involvement. This might have long-term implications for neuro infections and neurodegenerative diseases. Indeed, loss of olfaction is considered an early manifestation in Parkinson's disease (Doty, 2012; Chase and Markopoulou, 2020). Therefore, the emergence of cognitive symptoms following COVID-19 may indicate an underlying neurodegenerative process. Furthermore, individuals with certain immunocompromised neurological conditions such as multiple sclerosis (MS) may show alterations in their non-motor symptoms following COVID-19, which may indicate an underlying neurodegenerative process. Higher risk of developing Parkinson's disease and MS has been previously linked to SARS-CoV-1 infection (Fazzini et al., 1992; Murray et al., 1994). Indeed, long-term assessment of cognition will become a critical part of the care pathway for such individuals.

## Long-Term Cognitive Sequelae

From the emerging evidence and our understanding of the mechanism of CoV in the CNS, one can expect to have a range of cognitive consequences of COVID-19 infection. Attention and dysexecutive symptoms have commonly been reported with COVID-19 (Rogers et al., 2020; Varatharaj et al., 2020). Hypoperfusion in the frontotemporal region of the brain has also been reported (Helms et al., 2020) as well as structural brain abnormalities thalamic and temporal regions (Montalvan et al., 2020). Considering the demyelinating nature of the viral infection in the CNS, we can expect common cognitive problems that characterize demyelinating illnesses (such as MS). The Symbol Digit Modalities Test (SDMT), a test to assess the speed of information processing, is an exceptionally reliable and sensitive cognitive test for MS patients (Benedict et al., 2017). Similarly, a link between loss of smell in COVID-19 patients and the prodromal phase of Parkinson's disease should be kept in mind while examining long-term cognitive consequences. A large amount of research has shown that executive functions are primarily affected in the prodromal phase of Parkinson's disease along with prominent memory problems (Fengler et al., 2017). Taken together, the long-term cognitive examination of COVID-19 survivors should at least include tests assessing attention, executive functions, learning, and memory as well as the speed of information processing.



## Implications for Monitoring Long-Term Neuropsychiatric and Cognitive Sequelae

It is clear from the past outbreaks of SARS-CoV-1 and MERS and current reports of neurological and neuropsychiatric complications following COVID-19 that a large number of survivors will experience a range of neuropsychiatric and cognitive sequelae. These are likely to affect their mental, physical, and cognitive well-being. Which, in turn, will affect their emotional, occupational, and financial situations. Some of these patients may develop a full-blown neurological or psychiatric illness, or some might experience mild cognitive problems and that will increase their risk of developing dementia. Early indications show that the cognitive domains of executive functions, attention, and memory appear to be affected by COVID-19. Furthermore, there are potential increases in affective disorders, anxiety, fatigue, and PTSD (Hampshire et al., 2020; Lu et al., 2020; Woo et al., 2020), see **Table 1**. These symptoms can be due to pathoplastic change in brain physiology where the COVID-19 infection may modify brain functions after infection, which can lead to the development of brain vulnerabilities that may increase the probability to develop psychological distress. It is also possible that these neuropsychiatric symptoms and disorders are the psychological reactions of having contracted COVID-19 and undergoing associated medical interventions. This complex nature of neuropsychiatric presentations can be understood through a careful study of case history, accompanied by standardized neuropsychological assessments. This will help clarify if the neuropsychiatric and cognitive problems are a direct consequence of structural brain abnormalities or are a psychological reaction of the potential physical and the mental stress associated with recovering from COVID-19. Therefore, early detection and

prevention of neuropsychiatric and cognitive problems should be the long-term aim of health services and governments across the world as this could present as a “**third wave**” of the pandemic.

## CONCLUSION

The short-term neuropsychiatric and cognitive complications following COVID-19 are varied and affect a large proportion of COVID-19 survivors. In the medium- and long-term period, there is going to be an influx of patients with psychiatric and cognitive problems who were otherwise healthy prior to COVID-19 infection. Increased neuropsychiatric manifestations could be observed in the form of an increase in cases of depression, anxiety, PTSD, and in certain cases severe mental illnesses. Cognitive sequelae are also likely to be varied and a detailed cognitive evaluation should be considered for such individuals to monitor the emergence of new neurological cases. Robust neuropsychiatric and cognitive monitoring will enable health care providers to plan adequate health care delivery and allocate resources adequately. Early intervention for emerging cognitive problems will be critical for independent functioning and improved quality of life for many COVID-19 survivors.

## AUTHOR CONTRIBUTIONS

All authors participated in the literature search, manuscript preparation, and feedback on final manuscript. SK led the process and conceptualized the topic. All authors contributed to the article and approved the submitted version.

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# Parent and Child's Negative Emotions During COVID-19: The Moderating Role of Parental Attachment Style

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In February 2020, the coronavirus disease 2019 (COVID-19) appeared and spread rapidly in Italy. With the health emergency and social isolation, parents started spending more time with their children, and they might have experienced greater distress. Attachment style is considered as an effective emotion regulation strategy in the parent-child relationship. However, few empirical studies have addressed this issue. Based on attachment theory, this study aimed to find parental attachment style as a candidate to moderate the relation between parents' negative emotions and their perceptions of their children's negative emotions related to COVID-19. Parents ( $M_{age} = 42.55 \pm 6.56$ , 88.2% female) of 838 Italian children and adolescents aged 3 to 18 years participated in an online survey. Results showed that parents with a fearful attachment style had significantly higher negative emotions when facing COVID-19 than those with other attachment styles. Moreover, parents with a dismissing attachment style perceived fewer negative emotions in their children than parents with fearful and preoccupied styles. At last, higher parents' negative emotions were associated with greater perception of children's negative emotions only in parents classified as secure and fearful. These findings suggest that parents with dismissing and fearful attachment styles and their children may be at higher risk during the COVID-19 pandemic and they should be given long-term attention.

**Keywords:** attachment style, negative emotion, emotion regulation, COVID-19, children, parent

## INTRODUCTION

In February 2020, the coronavirus disease 2019 (COVID-19) spread rapidly in Italy and then forced a comprehensive lockdown on March 10, 2020. The whole country entered a large-scale isolation stage for the first time to control the pandemic (Liang et al., 2020). Together the health emergency and social isolation has caused great psychological pressure and several daily life changes for individuals.

In a recent survey of Chinese adults, it was found that individuals' perceived severity of COVID-19 increased their negative emotions (Li Y. et al., 2020), with higher levels of stress, anxiety, depression, and other symptoms (Wang H. et al., 2020). A survey with adults aged 16–75 years in the United Kingdom also showed that social isolation and loneliness brought on by COVID-19 increased the risk of anxiety, depression, and other negative consequences (Holmes et al., 2020). Similar results were also found in other countries (Moccia et al., 2020; Odriozola-González et al., 2020; Orgilés et al., 2020). In addition to adults, studies have shown that even young children can be aware of changes in their surroundings (Dalton et al., 2019, 2020). In a survey of Italian and Spanish parents, they realized that some of their children's emotions (such as boredom and irritability) and behaviors (such as sleep time) had changed compared with those before isolation (Orgilés et al., 2020).

During the isolation period, most people had to stay with their families, parents and children spent more time with each other, and they might have experienced greater distress. Adults' attention, reactions, and emotions toward COVID-19 affect their ability to sensitively recognize their children's troubles (Dalton et al., 2020). Research suggests that regardless of the child's age and gender, children and adolescents adjust their own emotions and behaviors according to adults' emotions and reactions (Stein et al., 2009; Xu et al., 2020). They are more likely to experience the pain, fear, and anxiety of those around them than adults (Bartlett et al., 2020). They would display more negative emotions and problem behaviors than usual (Liang et al., 2020). Previous studies on the impact of major disasters or sudden public health events on children's mental health have emphasized that children's negative emotions in different degrees may be due to the negative emotions of their parents (Sprang and Silman, 2013; Juth et al., 2015; Cobham et al., 2016). Unexplained and unpredictable situations such as the COVID-19 pandemic and the time of quarantine might be perceived as threatening and stressful by adults leading to negative emotions such as anxiety. Thus, when parents showed more negative emotions than those before isolation, children and adolescents were likely to be affected and might be at higher risk for psychological maladjustment (Dalton et al., 2020).

Parents are an important part of a child's personal resources, which can provide resilience-related factors to alleviate children's mental health problems in particularly stressful situations (Holmes et al., 2020). Parents, as a result of spending more time with their children and adolescents during lockdown, are their main and most available support. Previous findings suggest that parental stress is a powerful predictor of children's post-disaster adjustment (Pfefferbaum et al., 2015). Parents under a lot of pressure can be detrimental to a child's recovery from a disaster. The outbreak of the COVID-19 pandemic and the subsequent implementation of social isolation measures are not only inconvenient to life and daily routines, but also cause most parents to undertake a conversion in their family (parent) and work (employee) roles, in which, the boundary between family and work becomes challenging (Restubog et al., 2020). In the face of such changes, parents bear high levels of stress, anxiety, and other negative emotions (Sang et al., 2019;

Li S. et al., 2020; Pfefferbaum and North, 2020). Therefore, paying attention to parents' reactions and emotions can help find children and adolescents who are at a higher risk for psychological maladjustment during COVID-19, and plan specific interventions in the long term.

Parents' attachment style is one of the crucial factors connecting parents and their children (Li et al., 2015; Schimmenti and Bifulco, 2015). In times of stress, such as in the face of the pressure of COVID-19, attachment style may be seen as one of the key factors contributing to the emotion regulation of parents and children (Shaver and Mikulincer, 2007; Mikulincer and Shaver, 2019). Individuals with different attachment styles have different emotional reactions and ways of dealing with negative and positive events in life. Bartholomew and Horowitz (1991) proposed a four-category attachment model: secure, dismissing, fearful, and preoccupied. Secure attachment can be used as a flexible resource when needed, and it is the foundation of an individual's mental health and social adaptation (Mikulincer and Shaver, 2019). People with secure attachment style are more likely to effectively regulate their negative emotions and have hope for solving problems when they experience fear and threats (Nielsen et al., 2017). On the other hand, insecure adults have difficulties in emotion regulation (Jones et al., 2014). Dismissing, preoccupied, and fearful attachment styles are all seen as insecure, and they exhibit a higher level of anxiety and avoidance than secure attachment (Bartholomew and Horowitz, 1991; Welch and Houser, 2010). In detail, those with preoccupied and fearful attachment styles show stronger negative emotional reactions when facing negative events (Gentzler et al., 2010). Insecure attachment strategies will repeatedly activate and suppress negative emotions, and continue to rely on the distorted self and others, leading to poor physical and mental health (Mikulincer and Shaver, 2019; Pace et al., 2019).

Parents differ in their ability to communicate, feel, and respond to their children's emotions based on their attachment style (Sloman et al., 2002). Parents with a secure attachment style can provide emotional feedback to their children and respond to children's various emotions in a consistent and sensitive manner, so that children can adjust their emotional experience and promote the development of emotion regulation ability, whereas parents with insecure attachment styles provide less supportive and constructive behavior (Feeney and Collins, 2001; Jones et al., 2015). For example, parents with dismissing attachment style show limited ability to express emotions, and they show withdrawal if there is negative influence in the interaction with their children. Children of such parents adopt unsafe and avoidant emotion regulation strategies to minimize the expression of their own emotions, in order to get as close to the caregiver as possible (Sloman et al., 2002). Fearful parents have low trust in others and have a certain reaction to their children's emotional needs, but they keep a distance from them and avoid intimate contact with children to protect themselves from the expected rejection of others (Kilmann et al., 2009). Parents with a preoccupied attachment style have no goals to express themselves; they respond differently to their children and provide few emotional anchors to assist in regulating their emotional state. Children of such parents



cannot predict their parents' reactions and will develop greater insecurity and anxiety (Sloman et al., 2002). Mothers who reported greater attachment-related avoidance and anxiety had greater difficulties in regulating their emotions, resulting in more painful and less supportive responses to their children's negative emotions (Jones et al., 2014). Surprisingly, children with dismissing parents would report that their parents are warm and caring (Borelli et al., 2013). Researchers suggest that individuals with dismissing attachment style will not only evaluate stressful events as threatening but also evaluate themselves as able to cope with stressors (Mikulincer and Shaver, 2007). They have higher resilience and have a positive effect on well-being (Karreman and Vingerhoets, 2012). It may be because they have a higher degree of avoidant behaviors (Bartholomew and Horowitz, 1991; Wei et al., 2011); when encountering stressful events, they preferably use distancing coping strategies (such as stress denial) to maintain distance to others (Karreman and Vingerhoets, 2012). They may develop a survival tool of compulsively relying on themselves because of their caregivers' rejection and unresponsiveness (Wei et al., 2011). They often avoid or do not express their distress and idealize their parent-child relationship or tend to evaluate it positively (Borelli et al., 2013). However, such individuals may lack the correct understanding of themselves (Wei et al., 2011). Children whose parents were unresponsive to their needs would tend to, as adults, deactivate their attachment system in order to repress their emotions and withdraw from intimate relationships (Mikulincer et al., 2003). Thus, children with dismissing parents seem to be worthy of attention, because they would have resilience when dealing with short-term stress events, but if they were under long-term stress, they may be in trouble in later development (Bowlby, 1969).

Recent research suggests that COVID-19 and its consequences represented a risk factors for several kids (Holmes et al., 2020; Jiao et al., 2020; Lee, 2020; Liang et al., 2020; Orgilés et al., 2020; Wang G. et al., 2020). The long duration of isolation, fear of infection, frustration and boredom, lack of face-to-face contact with classmates, friends, and teachers, and the lack of personal space at home and other stress factors have caused children and adolescents to display varying degrees of negative emotions (Brooks et al., 2020; Wang G. et al., 2020). According to a survey of children and adolescents aged 3–18 years in China, which was completed by the parents, stress, distraction, and restlessness were the most common psychological and behavioral problems during isolation (Jiao et al., 2020). Similar results have been found in survey of parents with children aged 3 to 18 years old from Italy and Spain (Orgilés et al., 2020).

A recent survey on the psychological impact of COVID-19 showed that adults' attachment style modulated stress responsivity, and contrary to secure individuals, insecure individuals had a weaker ability to regulate emotion (Moccia et al., 2020). Furthermore, empirical studies showed that, in the face of disaster, supportive parenting behaviors can reduce children's anxiety (Pfefferbaum et al., 2015). Parents with secure attachment style have fewer conflicts with their children (La Valley and Guerrero, 2010), and it is negatively

related to adolescents' emotional problems, such as depressive symptoms (Zhang et al., 2010; Li et al., 2015). Therefore, it can be inferred that, under the influence of the COVID-19 pandemic, parents would experience different degrees of negative emotions due to their different attachment, among which, parents with secure attachment would have the lowest negative emotions compared to others, while parents with fearful attachment would display the most serious negative emotions. Moreover, parents reporting higher negative emotions were expected to depict children and adolescents with more negative emotions. Furthermore, it was hypothesized that parents' attachment style moderated the relation between parents' negative emotions and children's negative emotions as perceived by their parents. In detail, parents with a secure attachment style would report a lower level of negative emotions in their children than parents with insecure attachment. Dismissing parents would perceive a lower level of negative emotions in their children due to the habit of covering up their negative emotions, while parents with fearful and preoccupied attachment styles would describe children as having a higher level of negative emotions due to their less effective parenting behaviors linked to their own negative emotional reaction.

## MATERIALS AND METHODS

### Participants and Procedures

Between March 26 and April 5, 2020, parents of 838 Italian children and adolescents participated in our online survey. The children's ages ranged from 3 to 18 years old ( $Mage = 9.65$ ,  $SD = 4.36$ , 49.4% female). **Table 1** lists the sample characteristics. Parents had a mean age of 42.65 years ( $SD = 6.49$ , 88.3% female). In total, 69.9% had more than one child. Almost all participants (97.1%) had an Italian nationality, most of them had a monthly family income of more than 2,000 Euros (60.8%), and 57.8% of them held a bachelor degree or above, suggesting that a majority of the families came from a middle class context (i.e., SES level 3; Hollingshead, 1975).

This study was approved by the Ethical Committee for psychological research by the authors' university. Due to quarantine constraints, school principals and/or social networks (e.g., WhatsApp groups) were used to send out emails, using a snowball sampling strategy, to invite parents to join in the study. Informed consent was obtained before participants filled in all the questions voluntarily and anonymously, and it took about 10 min to complete the survey. Only one parent per household was required to participate in the study. Parents with more than one child were asked to fill in the questionnaire for each child.

### Measures

#### Parental Attachment Style

The Italian version of the Relationship Questionnaire (RQ) was used to measure adult attachment style (Fossati et al., 2007; Ravitz et al., 2010). This questionnaire includes two sections in which participants are required to evaluate: (a) four short essays

**TABLE 1** | Sample characteristics in sociodemographic variables ( $N = 838$ ).

Variables	<i>N</i>	%
<b>Parents</b>		
Mother	740	88.3
Age, <i>M</i> ( <i>SD</i> )	42.65	6.49
<b>Monthly family income (Euros)</b>		
Up to 999	43	5.1
Between 1000 and 1999	186	22.2
Between 2000 and 3999	240	28.6
Between 3000 and 4999	206	24.6
5000 or more	64	7.6
<b>Education level</b>		
Primary school	39	4.7
Secondary school	315	37.6
Undergraduate	357	42.6
Doctoral or master	127	15.2
<b>Mother's current employment situation</b>		
Self-employed	129	15.4
Part-time	153	18.3
Full-time	216	25.8
Unemployed	53	6.3
Lost job due to COVID-19	41	4.9
Smart-working	178	21.2
Other	55	6.6
<b>Father's current employment situation</b>		
Self-employed	225	26.8
Part-time	19	2.3
Full-time	399	47.6
Unemployed	16	1.9
Lost job due to COVID-19	17	2.0
Smart-working	134	16.0
Other	4	0.5
<b>Children</b>		
Female	411	49.4
Age, <i>M</i> ( <i>SD</i> )	9.65	4.36

describing the prototypes of the four attachment styles in the attachment process, which are secure, fearful, preoccupied, and dismissing; (b) their degree of conformity to each essay with a 7-point scale. For the present work, it was administered only for the first section. RQ showed adequate psychometrics characteristics (Ruvolo et al., 2001; Cozzarelli et al., 2003).

### Parents' Negative Emotions

Parents' negative emotions during the COVID-19 pandemic were measured with the Impact Scale of COVID-19 and home confinement (Orgilés et al., 2020). This scale includes three items rated on a 5-point Likert scale (from 1 = *nothing serious* to 5 = *very serious*). A higher score indicates that participants' negative emotions when facing COVID-19 are more severe. Sample items include: "How afraid are you of losing your job?" The Cronbach's  $\alpha$  was 0.539 in this study.

### Children's Negative Emotions

Children's negative emotions were measured by the Impact Scale of COVID-19 and home confinement on children and

adolescents (Orgilés et al., 2020). This scale includes 31 items of children's psychological responses to quarantine with a 5-point scale (from 1 = *Much less* to 5 = *Much more*). For the present work, parents reported on 18 items related to children's negative emotions based on their observations. A higher score indicates that participants' perception of children's negative emotions when facing the COVID-19 are more severe. Sample items include "Is afraid about COVID-19 infection" and "Is worried". The Cronbach's  $\alpha$  was 0.931 in this study.

### Data Analysis

Statistical Package for Social Science (IBM SPSS Version 21) and R Studio (Version 3.6.2) were used for data analysis. First, we carried out descriptive statistics to describe the data of the present sample. Second, correlation analysis and a series of analyses of variance (ANOVAs) were carried out to examine the association among the variables. Effect size was measured using partial eta-squared, in which small, medium, and large effects were 0.0099, 0.0588, and 0.1379, respectively (Cohen, 1988, p. 283). The Bonferroni *post hoc* test was used to compare means. Finally, hierarchical regression models were used to examine the moderation effect of attachment style in the association between parents' negative emotions and children's negative emotions. In the case of significant interaction effects, simple slope analysis was completed to examine the effects of parents' negative emotions separately by attachment styles. Given that attachment styles were multi-categorical variables representing four groups, three dummy variables (R1, R2, and R3) were created, with dismissing attachment serving as the reference group (dismissing: R1 = 0, R2 = 0, R3 = 0; fearful: R1 = 1, R2 = 0, R3 = 0; preoccupied: R1 = 0, R2 = 1, R3 = 0; secure: R1 = 0, R2 = 0, R3 = 1).

## RESULTS

### Descriptive Statistics, Correlations, and ANOVAs

Parents perceived more negative emotions ( $M = 3.04 \pm 0.781$ ) when they faced COVID-19, and they noticed an increase in children's negative emotions compared to before quarantine ( $M = 2.90 \pm 0.726$ ).

Correlation analysis showed that parents' negative emotions were significantly positively related to perceived children's negative emotions ( $r = 0.135, p < 0.01$ ).

The results of the ANOVAs showed that a main effect was found on parents' negative emotions depending on different attachment styles ( $F_{(3,834)} = 6.71, p < 0.001, \eta_p^2 = 0.024$ ). *Post hoc* analyses revealed that parents with a fearful attachment style had significantly higher negative emotions when facing COVID-19 than those with other attachment styles. Children's negative emotions perceived by their parents also showed a significant effect depending on different attachment styles ( $F_{(3,834)} = 4.22, p < 0.01, \eta_p^2 = 0.015$ ). Children with dismissing parents were perceived to display significantly lower negative emotions than those with parents with a fearful and preoccupied attachment style (see **Table 2**).

**TABLE 2** | Parents' negative emotions and children's negative emotions according to attachment styles and *post hoc* comparisons.

	Secure (1) (n = 385)		Fearful (2) (n = 172)		Preoccupied (3) (n = 109)		Dismissing (4) (n = 172)		F	Effect size ( $f^2$ )	Post hoc
	M	SD	M	SD	M	SD	M	SD			
Parents' negative emotions	2.96	0.77	3.27	0.72	3.00	0.78	2.99	0.81	6.71***	0.024	2 > 1,3,4
Children's negative emotions	2.90	0.73	2.97	0.67	3.02	0.68	2.75	0.76	4.22**	0.015	4 < 2,3

\*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

## The Moderation of Attachment Styles in the Association Between Parents' Negative Emotions and Children's Negative Emotions

We conducted hierarchical regression models to examine the association between parents' negative emotions and children's negative emotions as well as the moderation of attachment styles. The results of the full model are summarized in **Table 3**. The results showed that the main effect of parents' negative emotions on children's negative emotions was significant, suggesting that parents who perceived COVID-19 to be more severe observed more negative emotions in their children (see Model 1). The main effect of different attachment styles on children's negative emotions were also significant (see **Table 3**, Model 2). Parents with fearful, preoccupied, and secure attachment styles depicted their children with higher negative emotions than parents classified as dismissing. Furthermore, looking at Model 3, results showed that the interaction effects between parents' negative emotions and attachment styles were also significant.

Simple slope analysis revealed that the association between parents' negative emotions and perceived children's negative emotions had a significant positive slope in both the fearful and secure group (see **Figure 1**). In other words, higher parents' negative emotions were associated with greater perception of children's negative emotions only in parents with secure and fearful attachment styles. No significant effects were found referring to dismissing and preoccupied ones.

## DISCUSSION

COVID-19 has spread rapidly around the world, and the scope and extent of its impact was unexpected (Brooks et al., 2020; Holmes et al., 2020; Liang et al., 2020; Pfefferbaum and North, 2020). The current study aimed to explore how negative emotions observed in parent-child dyads in normative situations could assume a central role during not-normative situations such as the COVID-19 pandemic. In particular, parental attachment style appeared as a possible risk or resilience factor for emotional regulation of negative feelings showed by parents and perceived in their children during the pandemic.

This study found that compared with the emotions before isolation, both parents and children showed higher negative emotions during the isolation period. Parents' negative emotions affected children's negative emotions, when parents showed more

negative emotions, their children were perceived as showing more negative emotions. It was consistent with our hypothesis, and previous studies which have shown the same results, indicating that the performance of parents' emotion regulation affects their children's emotion regulation in particularly stressful situations (Sprang and Silman, 2013; Juth et al., 2015; Pfefferbaum et al., 2015; Cobham et al., 2016; Holmes et al., 2020; Liang et al., 2020; Orgilés et al., 2020).

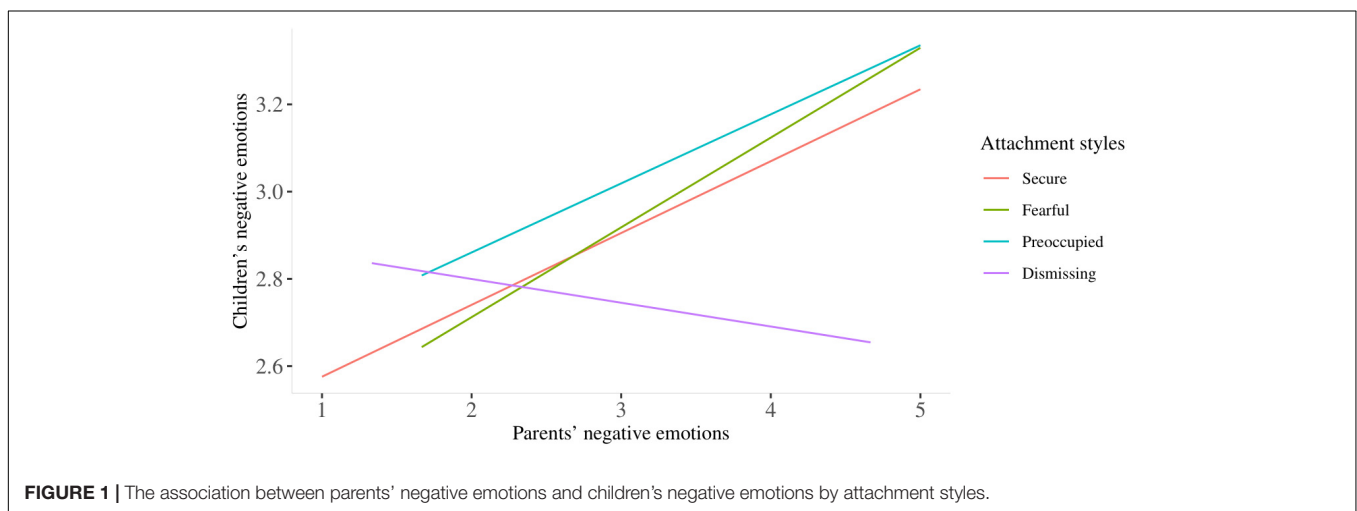
In addition, more importantly, it was found that the attachment style moderated the association between parents' negative emotions and children's negative emotions. When parents showed greater negative emotions, they could observe that children with parents with a dismissing attachment style reduced their negative emotions. According to the four-category attachment model (Bartholomew and Horowitz, 1991), parents with a dismissing attachment style find it difficult to trust or rely on others, so they often adopt negative parenting strategies when facing their children. Previous studies have also shown that dismissing individuals have less close and less satisfying relationships (Bartholomew and Horowitz, 1991; Wei et al., 2011; Tan et al., 2012). If parents and children are not used to expressing their emotions to each other, then children are more likely to control or cover up, deliberately underestimate, or even defensively deny the presence of their negative feelings without showing their true emotions in front of their parents (Sloman et al., 2002). Such children might be at higher risk because their parents cannot recognize their true feelings and have a weak sense of their emotional state (Brenning et al., 2012).

In contrast, parents with a fearful attachment style showed more negative emotions, and in turn, their children were reported as displaying more negative emotions as well. Parents classified as fearful harbor a negative view of the self, showing a strong sense of dependence on others and high anxiety. In the interaction activities between parents and children, parents may question their own value and worry about losing the child, so they will pay too much attention to the child and constantly monitor the child's emotions, but sometimes they are more focused on their own relational needs and worries of being rejected than on their children's emotional state. It may exacerbate the child's negative experience (Sloman et al., 2002). Under the pressure of COVID-19, these children may not only bear the worry and pressure of the pandemic but also bear the parents' maladjusted emotions and reactions, thus exacerbating the children's negative emotional burden. Unexpectedly, the perception of children's negative emotions by

**TABLE 3** | Hierarchical regression model of the association between parents' negative emotions and children's negative emotions and the moderation effect of attachment styles.

		<i>B</i>	<i>SE</i>	<i>R</i> <sup>2</sup>	Adjusted <i>R</i> <sup>2</sup>	<i>F</i>
Model 1	Parents' negative emotions	0.13***	0.03	0.018	0.017	15.54***
Model 2	Parents' negative emotions	0.12***	0.03	0.032	0.027	6.789***
	R1	0.19*	0.08			
	R2	0.27**	0.09			
	R3	0.16*	0.07			
Model 3	Parents' negative emotions	-0.05	0.07	0.042	0.034	5.22***
	R1	0.18*	0.08			
	R2	0.28**	0.09			
	R3	0.17*	0.07			
	Parents' negative emotions × R1	0.26**	0.10			
	Parents' negative emotions × R2	0.21	0.11			
	Parents' negative emotions × R3	0.22***	0.08			

*R*1, *R*2, *R*3 were dummy variables for coding attachment styles. Dismissing: *R*1 = 0, *R*2 = 0, *R*3 = 0; fearful: *R*1 = 1, *R*2 = 0, *R*3 = 0; preoccupied: *R*1 = 0, *R*2 = 1, *R*3 = 0; secure: *R*1 = 0, *R*2 = 0, *R*3 = 1. \**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001.

**FIGURE 1** | The association between parents' negative emotions and children's negative emotions by attachment styles.

secure parents was also more severe with the increase of their own negative emotion. This may be because secure parents have close relationships with their children, and their children often calm themselves and increase feelings of safety by seeking proximity to parents (Esbjorn et al., 2012). This might allow parents to have a more comprehensive and accurate perception of their child's emotions. In the face of the pandemic situation, when parents' emotional performance was more negative, children would feel the same strong severity, so they would be more negative. However, compared with the fearful attachment style, secure parents and their children displayed lower levels of negative emotions, it might be because in the daily activities between parents and children, the supportive parenting behaviors promote the development of the children's emotional regulation ability (Jabeen et al., 2013; Jones et al., 2015; Shlafer et al., 2015). Under the influence of the pandemic, they could regulate their emotions better.

The results of this study indicate that, in the face of major disasters or sudden public health events, attachment style plays a key role in moderating the relationship between parents

and children. These findings offer important implications in understanding and improving the mental health of children and adolescents under the influence of COVID-19. Parents with secure attachment can regulate their emotion under stressful situations, and their children will also be affected by them. Parents should provide more supportive parenting behaviors to promote children's emotional regulation ability. Parents with insecure attachment have a higher degree of adverse adaptation reactions under stressful and threatening events, and at the same time, their children may also experience negative emotions. These children may need more attention in the long term. In particular, the dismissing attachment style can buffer the association between parents' and children's emotions, but these kind of children may suppress their own emotions or their emotions have been ignored by their parents. Therefore, parents and children dyads characterized by dismissing and fearful parents might need long-term attention in order to monitor and support their negative emotions and their intrapersonal and interpersonal psychological adjustment.



It should be pointed out that there are still some limitations in this study. First, due to the limitation of pandemic isolation and considering the children's cognitive levels and comprehension, the information was only reported by parents, which increases common method bias. Moreover, the cross-sectional nature prevents us from inferring causality. Future research should collect self-reports from children and further reveal a causal relation through longitudinal design. In addition, some populations were over-represented, such as mothers. Future studies should collect a wider variety of representative samples in order to achieve more robust findings. Third, only three items were used to measure the parents' negative emotions, which may have made the internal consistency reliability of the scale not as high as desired. In addition, future research can explore other variables possibly affecting parents' emotions, and the perceptions of their children's feelings such as emotion regulation (Pace et al., 2018), alexithymia (Pace et al., 2015), and reflective functioning (Schultheis et al., 2019). Furthermore, future studies should also take into account children's attachment and they should explore in-depth the direction of the relation between parental negative emotions and children's negative emotions. Despite these limitations, this study could be the first applying the knowledge of the normative processes of parent-child emotion regulation, mediated by parental attachment style, in a non-normative situation like COVID-19. Moreover, the findings can be useful to support how certain processes, highlighted in non-risk situations, are applicable and take on particular relevance in planning family support and interventions in critical situations such as the current pandemic.

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## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of the Department of Philosophy, Social Sciences and Education of the University of Perugia (Italy). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

ZL, ED, YC, and CM contributed to the conception and design of the study. ZL and YC organized the database and performed the statistical analysis. ZL and ED wrote the first draft of the manuscript. CM wrote the sections of the manuscript. All authors contributed to manuscript revision, and read and approved the submitted version.

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# Psychological Impact of the COVID-19 Pandemic on Adults and Their Children in Italy

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**Aim:** The coronavirus disease 2019 (COVID-19) pandemic has abruptly changed the life of millions as travel and social contacts have been severely restricted. We assessed the psychological impact of COVID-19 on adults and children, with special attention to health care workers (HCWs).

**Methods:** A self-rated online survey, including the Impact of Event Scale-Revised (IES-R) for adults and the Children Revised Impact of Event Scale-Revised-13 items (CRIES-13) for their 8–18-year-old offspring, was conducted in Italy on March 20–26, 2020. Linear mixed-effects models were applied to the data, accounting for age, sex, education, and other demographic characteristics.

**Results:** Data were available from 2,419 adults (78.4% females, mean age 38.1 ± SD 13.1 years; 15.7% HCW) and 786 children (50.1% male, mean age 12.3 ± 3.2 years). Median (IQR) IES-R score was 30.0 (21.0–40.0), corresponding to mild psychological impact, with 33.2% reporting severe psychological impact. IES-R was lower in HCWs (29.0) than non-HCWs (31.0), but HCWs directly involved in COVID-19 care had higher scores [33.0 (26.0–43.2)] than uninvolved HCWs [28.0 (19.0–36.0)]. Median CRIES-13 score was [21.0 (11.0–32.0)], with 30.9% of the children at high risk for post-traumatic stress disorder. Parent and child scores were correlated.

**Conclusions:** Up to 30% of adult and children in the pandemic area are at high risk for post-traumatic stress disturbances. The risk is greater for HCWs directly involved in COVID-19 care and for their children.

**Keywords:** children, COVID-19, health care workers, pandemic, psychological impact

## INTRODUCTION

On the 11th of March 2020, the WHO reported that the coronavirus disease 2019 (COVID-19) had become a pandemic, involving 114 countries and more than 118,000 cases. Italy, with 42,220 cases and 3,200 deaths as of March 20, 2020 (1) had the second highest number of COVID-19 cases worldwide, after China (2). On March 10th, in an attempt to contain the spreading of the infection, the Italian government closed all non-essential businesses and services,



including also schools, universities, parks, theaters, and museums, and imposed severe limitations on the freedom to move and interact socially. In the following days, these public health dispositions were further tightened so that the entire Italian population was put on a lockdown.

Despite all efforts to contain the infection, the Italian National Health Care System was severely tested and health care workers (HCWs) overwhelmed by the demand (3). As previously happened in Wuhan, during the peak of the COVID-19 outbreak, HCWs faced a particularly stressful situation, with high risk of infection, inadequate access to protective devices, and social isolation, with consequent emergence of anxiety and depressive symptoms (4–7). These mental health problems can not only affect HCWs' attention, understanding, and decision-making ability, but also have lasting consequences for their well-being. During the 2003 outbreak of severe acute respiratory syndrome (SARS), a similar but much more limited epidemic, high levels of psychological distress and post-traumatic stress symptomatology (PTSS) were reported among HCWs (8, 9). A study conducted by Wang and colleagues 2 weeks into the China's outbreak of COVID-19 found that about half of the surveyed HCWs reported moderate to severe psychological impact, with about one-third reporting moderate to severe anxiety symptoms (10).

While data are available on the impact of the pandemic on HCWs (6, 7), little is known about possible effect on children, and in particular the children of HCW directly involved in COVID-19 care. In fact, since the beginning of the pandemic, more than 15,000 HCWs had been infected and 109 had died as of April 10, 2020 (11). Another relevant and yet unexplored issue is the worry that parents, and particularly HCWs, may have of infecting their children and of possible long-term consequences of COVID-19 (12, 13).

In this study, we evaluated the psychological impact of the COVID-19 pandemic on a sample of adults and their children, with special attention to HCWs, during the first 2 weeks of the COVID-19 outbreak in Italy, at time when the entire country was on general lockdown. We hypothesized that HCWs involved in COVID-19 care and their children would have greater indexes of psychological distress.

## MATERIALS AND METHODS

### Design and Participants

We conducted a cross-sectional survey among the general public in Italy during the peak of the COVID-19 pandemic to assess adult and child psychological response through an anonymous online questionnaire. A snowball strategy was adopted. The online survey was first spread through WhatsApp among HCW colleagues and acquaintances in the North-West of Italy, encouraging them to pass it on to others, health professionals or not. Participants gave informed consent and completed the survey via an online platform (Google Forms, Google LLC, 1600 Amphitheater Parkway, Mountain View, CA 94043, USA). Participants who had children between 8 and 18 years of age were instructed to have them complete the child survey (CRIES-13). Expedited approval was obtained from the institutional ethics

committee. Data were collected between 3 P.M. of the 20th March 2020 and 6 P.M. of the 26th.

### Assessments

Participants provided information about their age, gender, birthplace, residence area, education level, marital status, and any offspring between 8 and 18 years of age. Participants also were asked about place of work and whether they or their family partner were HCWs (physician or nurse) and directly involved in providing COVID-19-related care. Participants were also queried about having tested positive to the virus, or if any relative or friend had contracted COVID-19. Work exposure to COVID-19 was coded yes/no, and extent of daily exposure to COVID-19 patients was rated on Likert scale from never to always. As we were in a very early stage of the pandemic, we only inquired whether participants' close relatives had tested positive to the COVID-19 virus, as death from the disease was still a relatively rare event.

The psychological impact of COVID-19 among adults was measured on the Impact of Event Scale-Revised (IES-R) (14). The IES-R is a self-administered questionnaire that has been validated in the Italian population (15) to measure post-traumatic stress symptomatology in the past seven days. It is a 22-item questionnaire on a five-point Likert scale (0–4, with labels of “Not at all” to “Extremely”) with three subscales measuring avoidance, intrusion, and hyperarousal, and generating a total score. Total IES-R score can be considered normal (0–23) or indicative of mild (24–32), moderate (33–36), or severe ( $\geq 37$ ) psychological impact. In our sample, the IES-R Cronbach's alpha was excellent ( $\alpha = 0.91$ ).

Children completed the Children's Revised Impact of Event Scale (CRIES-13), which is a 13-item scale adapted from the Impact of Event Scale (IES) (16, 17). It is widely used to screen children at high risk for post-traumatic stress disorder (PTSD). Items are rated on a four-point Likert scale (None = 0, Rarely = 1, Sometimes = 3, and A lot = 5), according to the frequency of recurrence of post-traumatic stress reactions during the past week, as well as in relation to a specific traumatic event noted at the top of the scale. The total score can range from 0 to 65, and is obtained from the scores of the three subscales (intrusion, avoidance, and arousal). A cut-off of 30 identifies children at risk for PTSD (16). In the study sample, CRIES-13 had a high level of internal consistency, as shown by a Cronbach's alpha of 0.86.

### Statistical Analyses

Statistical analyses were performed using the statistical programming language “R” (version 3.5.1) (18). Descriptive statistics were calculated for sociodemographic characteristics, current job activity, and risk exposure to COVID-19 (Tables 1, 2). Continuous variables were described by median and interquartile range (IQR). Categorical data were expressed as percentage. Linear mixed models (lme4 package) were used to identify variables associated with IES-R and CRIES-13 scores (19). Separate models were run for adults and children. The specified model for adults had fixed effects for HCW (yes/no) and CoV-SARS2 exposure (high/low). As HCWs were expected to have higher exposure than non-HCWs, the interaction between

**TABLE 1** | Adults: socio-demographics and psychological impact (IES-R).

Variable	No. (%)		
	All subjects <i>N</i> = 2,419	HCWs <i>N</i> = 380	Non-HCWs <i>N</i> = 2,039
<b>Gender</b>			
Male	522 (21.6)	84 (22.1)	438 (21.5)
Female	1,897 (78.4)	296 (77.9)	1,601 (78.5)
<b>Age, y</b>			
18–29	802 (33.2)	84 (22.1)	718 (35.2)
30–49	1,102 (45.6)	216 (56.8)	886 (43.5)
50–69	493 (20.4)	77 (20.3)	416 (20.4)
Over 70	22 (0.8)	3 (0.8)	19 (0.9)
<b>Marital status</b>			
Single	937 (38.7)	129 (33.9)	808 (39.6)
Married/cohabitant	1,337 (55.3)	227 (59.8)	1,110 (54.4)
Divorced/separated	123 (5.1)	21 (5.5)	102 (5.0)
Widowed	22 (0.9)	3 (0.8)	19 (1.0)
<b>Education level (ISCED level)</b>			
Pre-primary/primary education (0/1)	7 (0.3)	0 (0)	6 (0.3)
Lower secondary education (2)	149 (6.2)	1 (0.3)	148 (7.3)
Upper/post-secondary education (3/4)	811 (33.5)	23 (6.2)	788 (38.6)
First tertiary education (5)	1,048 (43.3)	163 (42.9)	885 (43.4)
Second tertiary education (6)	404 (16.7)	192 (50.6)	212 (10.4)
<b>Place of working activity in Italy</b>			
North	2,086 (86.2)	314 (82.6)	1,784 (85.7)
Central	220 (9.1)	47 (12.4)	167 (8.2)
South	113 (4.7)	19 (5.0)	124 (6.1)
<b>Your partner is an HCW:</b>			
Yes	–	109 (28.7)	–
No	–	191 (50.2)	–
Single	–	80 (21.1)	–
<b>Your partner is daily exposed to Covid-19:</b>			
Yes	–	48 (12.6)	–
No	–	252 (66.3)	–
Single	–	80 (21.1)	–
<b>Someone close to you is Covid-19+?</b>			
Yes	632 (26.1)	160 (42.1)	472 (23.1)
No	1,787 (73.9)	220 (57.9)	1,567 (76.9)
<b>How often are you exposed to Covid-19?</b>			
Never	415 (17.2)	15 (3.9)	400 (19.6)
Sometimes	1,604 (66.3)	193 (50.8)	1,411 (69.2)
Often	361 (14.9)	154 (40.6)	207 (10.2)
Always	39 (1.6)	18 (4.7)	21 (1.0)
<b>Number of sons aged 8–18</b>			
1 son	334 (13.8)	50 (13.2)	284 (13.9)
2 sons	183 (7.6)	28 (7.4)	155 (7.6)
More than 2	43 (1.8)	7 (1.8)	36 (1.8)
No sons aged 8–18	1,859 (76.8)	295 (77.6)	1,564 (76.7)
<b>IES-R, median (IQR)</b>			
Total score	30.0 (21.0–40.0)	29.0 (21.0–40.0)	31.0 (21.0–40.0)
Intrusion	11.0 (7.0–15.0)	11.0 (7.0–16.0)	11.0 (7.0–15.0)
Avoidance	11.0 (8.0–15.0)	10.0 (7.0–14.0)	12.0 (8.0–15.0)
Hyperarousal	8.0 (5.0–12.0)	8.0 (5.0–11.0)	8.0 (5.0–12.0)

HCW, health care worker; IES-R, 22-item Impact of Event Scale–Revised; IQR, interquartile range; ISCED, International Standard Classification of Education.

**TABLE 2** | Children: demographics and psychological impact (CRIES-13).

Variable	All subjects N = 786	HCW parent N = 120	Non-HCW parent N = 666
<b>Gender</b>			
Male	394 (50.1)	56 (46.7)	338 (50.8)
Female	392 (49.9)	64 (53.3)	328 (49.2)
<b>Age, y</b>			
8–10	288 (36.6)	45 (37.5)	243 (36.5)
11–13	203 (25.8)	34 (28.3)	169 (25.4)
14–16	187 (23.8)	24 (20)	163 (24.5)
17–18	108 (13.8)	17 (14.2)	91 (13.6)
<b>CRIES-13, median (IQR)</b>			
Total score	21.0 (11.0–32.0)	21.0 (9.0–31.7)	21.5 (12.0–32.2)
Intrusion	6.0 (2.0–10.0)	6.0 (2.0–10.0)	6.0 (2.0–10.0)
Avoidance	6.5 (1.0–12.0)	5.0 (0.0–11.0)	7.0 (2.0–12.0)
Arousal	8.0 (3.0–13.0)	7.0 (3.0–14.0)	8.0 (4.0–13.0)

HCW, health care worker; CRIES-13, Children's Revised Impact of Event Scale 13-item; IQR, interquartile range.

these two factors was taken into account by including a further fixed effect. The difference between HCWs currently employed in COVID-19 wards and those uninvolved in direct COVID-19 care was modeled with the use of a second model with fixed effect for COVID-19 ward employment (yes/no). Both models were adjusted for workplace, gender, educational attainment and age (categorized).

As parental stress could influence children, offspring stress expression models included IES-R as a fixed effect (20). Child age and having or not a HCW parent were the other fixed effect factors. To verify whether there was an association between siblings' psychological impact, we added sibling's CRIES-13 for fixed effect in the analysis of data from families with more than one child aged 8–18 years. To this end, we alternatively used the CRIES-13 score of one sibling (sibling 1) as the outcome measure and the score of other (sibling 2) as a predictor. The difference between children of HCWs currently employed in COVID-19 wards and children of other HCWs was modeled with the use of a third model with fixed effect for parents' COVID-19 ward employment (yes/no). Random effects in all the offspring models were: parent education, parent's workplace, gender, number of siblings, and parent's COVID-19 exposure intensity. Group differences were assessed with Mann Whitney *U*-test. Statistical significance was set at  $p < 0.05$ . To verify whether violation of the normality of residuals assumption and outliers affected the linear mixed model analyses, robustified versions of the same linear mixed models were also conducted (data not shown) (21).

## RESULTS

### Socio-Demographics Characteristics

We received responses from 2,438 adults, of whom 19 did not give consent to the use of the data (participation rate: 99.2%). Participants were 2,419 adults (mean age  $38.1 \pm 13.1$  year;

78.4% females) from all parts of Italy (North:  $n = 2,086$ , 86.2%; Central:  $n = 220$ , 9.1%; South:  $n = 113$ , 4.7%). Most participants were married or cohabitant (1,337, 55.3%), 937 (38.7%) were single, 123 (5.1%) divorced or separated, and 22 (0.9%) widowed (Table 1). Almost half of the sample (49%) had children. Of the adult participants, 380 (15.7%) were HCWs, of whom 294 (77.4%) physicians and 86 (22.6%) nurses. Of the HCWs, 122 (32.1%) were currently employed in COVID-19 wards. Only 27 subjects (1.1%) had tested positive to Covid-19. Data were collected on 786 children (394 or 50.1% males), with mean age  $12.3 \pm 3.2$  years. Demographics are reported in Table 2.

### Psychological Impact of COVID-19

In adults, the IES-R total score median (IQR) was 30.0 (21.0–40.0), corresponding to mild psychological impact (Table 1; Figure 1). For 30.4%, the IES-R score was in the normal range (0–23). One third (33.2%) had a score consistent with severe psychological impact (i.e., IES-R  $\geq 37$ ), with no significant difference between HCW (29.7%) and non-HCW participants (33.8%). However, HCWs involved in direct COVID-19 care had higher median IES-R scores [33.0 (26.0–43.2)] than uninvolved HCWs [28.0 (19.0–36.0)]. Having a relative who had tested positive to SARS-CoV-2 was not associated with a higher IES-R score.

In children, the CRIES-13 total score median (IQR) was [21.0 (11.0–32.0)], i.e., below the cut-off of 30 for being at risk for PTSD. For 30.9% the CRIES-13 score was 30 or greater (Table 2). No significant differences were found between children of HCW parents [21.0 (9.0–31.7)] and those of non-HCWs [21.5 (12.0–32.2)] on the total CRIES-13 score. Furthermore, there was no significant difference between children of HCW parents who were directly involved in COVID-19 care and those of HCW parents who did not have such an involvement (Table 5).

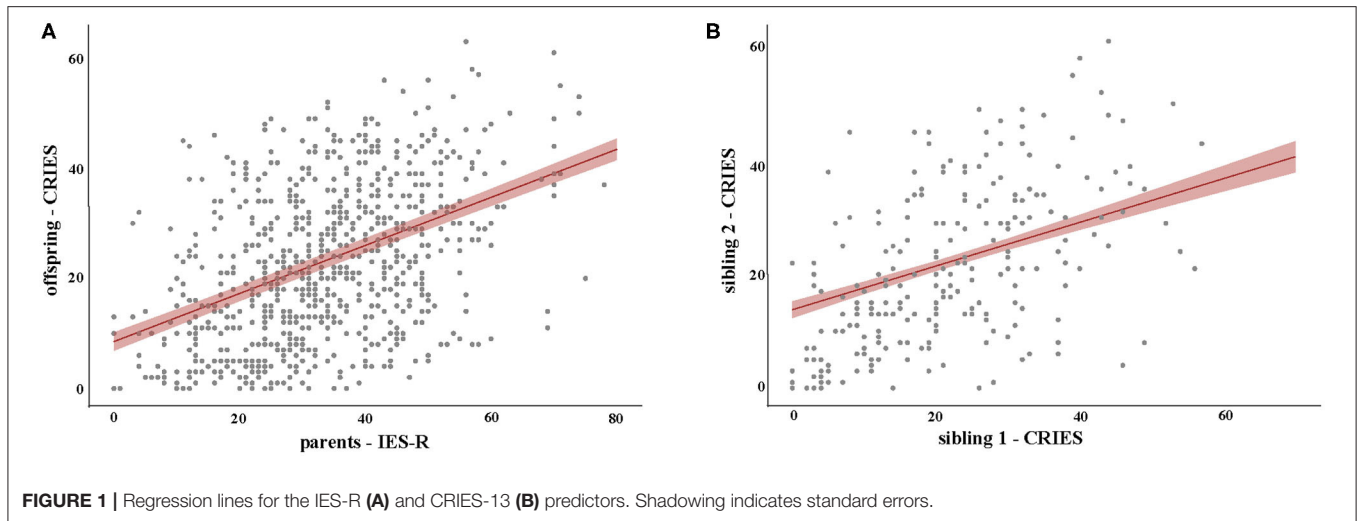
### Factors Associated With Psychological Distress

In adults, being female was strongly associated with higher IES-R scores ( $p < 0.001$ , Mann-Whitney *U*-test) (Table 3). Thus, data were also analyzed by sex. Overall, being a HCW was associated with lower IES-R total scores [estimated mean difference  $-2.48$  ( $-4.39$  to  $-0.57$ )], as shown in Table 3 (Model 1). However, HCW employed in COVID-19 wards reported more distress than other HCWs [estimated mean difference 5.71 ( $-2.92$  to 8.50), Model 2, Table 3].

In males, age or being a HCW was not associated with the reported level of distress (Table 3). But male HCWs who were employed in COVID-19 wards reported significantly higher distress than other male HCWs (Model 2, Table 3).

In females, all previously identified factors (i.e., HCW, COVID-19 exposure, and employed in COVID-19 wards) were associated with IES-R scores (Table 3).

In children, CRIES-13 scores were related to their parents' IES-R scores (see Table 4 and Supplementary Figure 1). Importantly this finding held true for both single children and for siblings (Table 4 and Supplementary Material). Additionally, siblings' CRIES-13 are correlated, suggesting a possible "family effect" for distress. In agreement with previous



**FIGURE 1** | Regression lines for the IES-R (A) and CRIES-13 (B) predictors. Shadowing indicates standard errors.

**TABLE 3** | Factors associated with psychological impact in adults.

Predictor	Outcome—psychological impact (IES-R)			
	Model 1		Model 2	
	Estimate	95% CI	Estimate	95% CI
<b>Being a HCW</b>				
Both males and females	-2.48*	-4.39, -0.57	-	-
Males only	-1.64	-5.38, 2.10	-	-
Females only	-2.66*	-4.86, -0.46	-	-
<b>High exposure to Covid-19</b>				
Both males and females	4.95***	3.14, 6.76	-	-
Males only	-1.07	-5.07, 2.93	-	-
Females only	6.34***	4.32, 2.52	-	-
<b>Working on Covid-19 ward</b>				
Both males and females	-	-	5.71***	2.92, 8.50
Males only	-	-	9.97**	3.68, 16.26
Females only	-	-	4.70**	1.60, 7.80

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

findings (22) and similarly to adult results, girls expressed higher distress level ( $p < 0.001$ , Mann-Whitney  $U$ -test). No other factors were significantly associated with CRIES-13 scores in our model (Tables 4, 5 and Supplementary Material).

## DISCUSSION

This study investigated the psychological impact of the COVID-19 epidemics on adults and children at the time of the highest daily increase in infections in Italy (11). By using a large, nationwide, self-selected sample and validated measures of psychological impact from traumatic situations, we found that about one third of the participants reported moderate-to-severe psychological distress. HCWs were not, as a group, at higher risk for psychological distress

**TABLE 4** | Factors associated with psychological impact in children.

Predictor	Outcome—psychological impact (CRIES-13)			
	All subjects		Sibling-1	
	Estimate	95% CI	Estimate	95% CI
Parental psychological impact (IES-R)	0.44***	0.31, 0.50	0.30***	0.19, 0.40
Age	-0.22	-0.49, 0.04	0.08	-0.38, 0.53
Have a HCW parent	-1.73	-3.95, 0.48	-0.35	-3.95, 3.24
Sibling-2 psychological impact (CRIES-13)	-	-	0.38***	0.28, 0.49

\*\*\* $p < 0.001$ .

**TABLE 5** | Factors associated with psychological impact in HCWs' children.

Predictor	Outcome—psychological impact (CRIES-13)	
	All subjects	
	Estimate	95% CI
Parental psychological impact (IES-R)	0.36***	0.16, 0.57
Age	-0.19	-0.84, 0.47
Have a Covid-19 involved parent	1.18	-9.45, 11.80
Parental IES-R $\times$ Covid-19 involved parent	0.07	-0.22, 0.35

\*\*\* $p < 0.001$ .

than non-HCWs, but those HCWs directly involved in providing COVID-19 care had significantly higher indexes of distress.



Children's ratings were correlated to those of their parents, and about 30% of them had indexes indicative of higher risk for post-traumatic distress. A correlation between parent and child ratings is expected, reflecting a commonality of contextual factors related to COVID-19 and a similarity in temperamental traits and emotional communication capacity that are likely to be both genetically and environmentally influenced (23). Consistent with the psychiatric literature on mood and anxiety disorders and other reports on post-traumatic stress, females reported greater psychological distress than males, in both the whole sample and the HCW subgroup (4).

The IES-R scores in our sample are consistent with those recently reported in studies of the general population (IES-R mean 32.98) and HCWs (IES-R median 21.0) in the Wuhan area in China (4, 10). Our study expands on previous reports by examining HCWs within a sample of the general population and by assessing the impact of COVID-19 on children in relation to their parents.

The results suggest that HCWs experienced, in general, less psychological distress than non-HCWs, but HCWs currently working on COVID-19 wards reported more distress, with IES-R scores indicating high risk for experiencing psychological breakdown and developing PTSD. Being directly involved in COVID-19-related healthcare was in fact the only predictor of higher distress in both males and females. Several reasons could explain these findings. On one hand, greater familiarity with health issues in general and a deeper understanding of the infection mechanisms could have helped HCWs control anxiety and reduce distress. Even during the pandemic social lockdown, HCWs were allowed to leave home and continue working, and were less restricted in social contacts than the general population, thus limiting possible feelings of boredom, frustration, and uselessness brought by the lockdown. Additionally, while many people suffered from job insecurity and faced economic uncertainty, HCWs had greater job security during the pandemic.

On the other hand, HCWs who were directly involved in COVID-19 care were more exposed to the risk of contagion and might have faced emotional pain and stress at work. During the SARS outbreak in 2003, 17.3% of the HCWs reported mental symptoms, which persisted in 15.4% at 1-year follow-up (24). In another study during the SARS outbreak in Singapore, the rate of HCWs reporting psychiatric symptoms was 17.7%, using a cut off of 26 on the IES (9). These rates are lower than in our study, possibly reflecting the extraordinary morbidity and global reach of the COVID-19 pandemic in Italy, as well as the influence of cultural factors on the perception and reporting of emotional distress.

Relatively little has been known about the psychological distress of children exposed to the pandemic. Concern has been raised that children might be particularly sensitive to the psychological effects of COVID-19 (10, 25–27). Fear of infection and home confinement could be particularly stressful for young people. Children and adolescents may be more vulnerable also because of home confinement, school closure, lack of in-person contact with classmates, friends, romantic partners, and teachers, and limitation in personal space at home (28). In this context, the role of parents becomes especially important for attenuating the

psychological detrimental effects of confinement. From the child development literature, we know that children rely on trusted adults for protection and as a reference for assessing danger and attributing meaning to events (20, 29–31). Thus, it can be especially frightening for a child to perceive that the parent is distressed and unable to prevent a traumatizing event from happening. The correlation between parent (IES-R) and child (CRIES-13) psychological distress underscores the strong link existing between parent-child mental health and brings attention to the critical role of the parent in buffering the distressing effects of the pandemic and its consequences upon their children. Unlike other reports of young age being a risk factor for post-traumatic reactions (32–34), we did not find age to be a significant moderator of psychological distress in children, possibly because the sample did not include very young children.

## Limitations

This study has several limitations that must be considered in interpreting the data. First, even though the survey was widely disseminated nationwide, the sample was self-selected and not representative of the Italian population. This is evident, for example, by the 3:1 female/male ratio. This higher proportion of females is, however, comparable to previous studies on the pandemic (4, 10), thus indicating that females are more prone to complete this type of surveys. Second, the data rely on just one self-rating instrument, the IES-R for adults or the CRIES-13 for children, without other measures of current or past psychopathology. Indeed, this is a cross-sectional study and future time points will be needed to understand the psychological impact of the pandemics. Another limitation of the present study is that the IES-R had not been structured for ongoing stressful events, such as pandemics, and is not a diagnostic tool for PTSD. However, to the best of our knowledge, no more specific assessment tools have been so far validated for such events. Finally, the online survey could not control for possible heterogeneity in the way parents had their children complete the questionnaire.

## Conclusion

This study informs on the psychological impact of the COVID-19 pandemic on adults and children in Italy, with special attention to the greater risk for psychological distress among those HCWs directly involved in COVID-19 clinical care and their children. About one-third of the surveyed children reported significant distress. The close link between parent- and child-reported distress suggests that interventions aimed at preventing and managing COVID-19 related anxiety in children should take into account parental distress. Successful management of distress in parents may positively reflect on their children's mental health.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethical Committee of the AOU Città della Salute e della Scienza di Torino. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## AUTHOR CONTRIBUTIONS

CD and AG conceived and designed the study protocol with input from DM and BV. AG carried out literature searches.

DM designed and carried out the statistical analysis. CD, AG, DM, and BV interpreted the data and drafted the manuscript. FR and FA supervised the writing of the manuscript. All authors critically reviewed and contribute to the final version of the paper.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2021.572997/full#supplementary-material>

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# Compliance and Self-Reporting During the COVID-19 Pandemic: A Cross-Cultural Study of Trust and Self-Conscious Emotions in the United States, Italy, and South Korea

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The coronavirus COVID-19 pandemic is an unprecedented health crisis. Many governments around the world have responded by implementing lockdown measures of various degrees of intensity. To be effective, these measures must rely on citizens' cooperation. In the present study, we drew samples from the United States ( $N = 597$ ), Italy ( $N = 606$ ), and South Korea ( $N = 693$ ) and examined predictors of compliance with social distancing and intentions to report the infection to both authorities and acquaintances. Data were collected between April 6th and 8th 2020. We investigated the role of cultural orientations of horizontal and vertical individualism and collectivism, self-conscious emotions of shame and guilt related to the infection and trust in the government's action. Across all countries, vertical collectivism (VC) predicted stronger shame, whereas horizontal collectivism predicted stronger trust in the government. Only in the United States, VC was associated with stronger trust. Stronger feelings of shame predicted lower compliance and intentions to report the infection to both authorities and acquaintances. In contrast, guilt was associated with stronger intentions to report the infection to the authorities. Finally, trust was associated with stronger compliance and intentions to report the infection to the authorities. Unlike Italy and South Korea, the association between trust on compliance was not statistically significant in the United States, implications of the findings, and directions for future research are discussed.

**Keywords:** horizontal and vertical individualism and collectivism, shame, guilt, trust, COVID-19, pandemic, self-reporting, social-distancing

## INTRODUCTION

The coronavirus COVID-19 pandemic is an unprecedented health crisis that has forced nearly a third of the world population into lockdown (Kaplan et al., 2020). Lockdowns are "behavioral" (non-pharmaceutical) measures involving forced isolation, movement restrictions, and active government surveillance. These measures effectively slow the virus's diffusion because they reduce contagion rates (Cowling et al., 2020; Ferguson et al., 2020; Flaxman et al., 2020). Reducing



contagion is an important objective, especially in the absence of effective antiviral drugs, vaccines, or widespread population immunity, all still unavailable in the context of the new pandemic.

To be sustained in time, and be more effective, non-pharmaceutical interventions must rely, at least in part, on citizens' active cooperation with authorities, especially in those countries characterized by democratic political systems. In the present research, we examined critical predictors of cooperation across three different contexts: the United States, Italy, and South Korea. Specifically, we focused on trust toward the government (e.g., Morse et al., 2016), and self-conscious emotions related to the infection (guilt and shame; Finerman and Bennett, 1995). We contribute to the growing psychological literature on COVID-19 (Capraro and Barcelo, 2020, 2021; Lalot et al., 2020a,b; Van Bavel et al., 2020a,b; Yamada et al., 2021) by investigating the associations between these variables and individuals' compliance with social distancing rules, as well as their intentions to report the infection to both health authorities and acquaintances/friends. Because cultural values may be associated with these variables differently across contexts, we also examined the role of individual-level cultural orientations of vertical and horizontal individualism and collectivism.

## HORIZONTAL AND VERTICAL INDIVIDUALISM AND COLLECTIVISM

Culture may be defined as shared meaning, shaping individuals' basic psychological processes and informing their understanding of the world (Triandis, 2001). Two of the most fundamental dimensions of cultural variations are individualism and collectivism (Triandis, 1995; Hofstede, 2001). These values frame individuals' interpretation of reality, emphasizing the importance of "the individual" or "the collective," respectively. Because responses to the novel pandemic are likely to involve tradeoffs and adjustments between these two value frameworks, individualism and collectivism are likely to play an essential role in how people behave.

Individualism and collectivism reflect the extent to which cultural groups value independence vs interdependence (Markus and Kitayama, 1991; Kitayama et al., 2009; Park et al., 2016). In individualistic cultures, individuals are socialized toward independence, autonomy of the self and self-reliance. Conversely, in cultures where collectivism is a principal value, individuals are socialized toward interdependence, an interconnected self and the importance of relationships. Individualism and collectivism have attracted a substantial share of research attention across various countries and settings (Gudykunst and Ting-Toomey, 1988; Hofstede, 2001; House et al., 2004).

These dimensions have recently been extended to consider cultures' different emphasis on equality vs hierarchy (Triandis and Gelfand, 1998; Oyserman et al., 2002; Shavitt et al., 2011a,b). "Horizontal" cultures place importance on equality in status, either in the context of an independent (horizontal individualism, HI) or interdependent (horizontal collectivism, HC) self. Conversely, "vertical" cultures place importance on

hierarchical relationships and differences in status, either in the context of competing individuals (vertical individualism, VI) or ranked groups (vertical collectivism, VC). This fourfold typology is an important predictor of a range of behaviors and attitudes (Triandis and Gelfand, 1998; Shavitt et al., 2006, 2011a,b; Moon et al., 2018; Travaglino and Moon, 2020).

In the present research, we sampled participants from three different contexts characterized by different prevalent cultural themes. The United States' dominant themes are individualism and verticality (e.g., Shavitt et al., 2006; Torelli and Shavitt, 2010), with a strong emphasis on the uniqueness and independence of the self as well as status and competition. In Korea, the prevalent cultural themes are group harmony, obedience to authority and an emphasis on status hierarchies, a configuration of values congruent with VC (Triandis and Gelfand, 1998; Shavitt et al., 2006). Relatively less research has examined the Italian context concerning the horizontal and vertical individualism and collectivism (HVIC) typology. However, there seems to be some evidence that the prevalent cultural theme in Italy falls between the United States and Korea in terms of the individualism-collectivism dimension, with a stronger emphasis on horizontality compared to the other two countries (Hofstede et al., 2010; Burton et al., 2019; Germani et al., 2020).

Beyond country-level differences, there is heterogeneity in the values that individuals within countries endorse (cf. Oyserman et al., 2002; Green et al., 2005; Cho et al., 2010; Taras et al., 2016; Burton et al., 2019). It is thus essential to examine endorsement of cultural values at the individual level, as well as variations across contexts. In the subsequent text, "*cultural values*" or "*themes*" refer to the country level of analysis, and "*cultural orientations*" refer to the individual level of analysis.

In the present study, we investigated how cultural orientations within countries characterized by different cultural themes may predict a range of responses to the virus-related emergency, namely trust in the government's action, and self-conscious emotions of shame and guilt. We then investigated how such factors predict individuals' intentions to comply with social distancing and report the infection to authorities and acquaintances.

## Trust in Government

Trust in government refers to beliefs and attitudes about the government's competence and good faith (cf. Levi and Stoker, 2000; Nannestad, 2008). It is a critical feature of the relationship between individuals and institutions. Trust is linked with the government's performance and reflects the levels of social and civic engagement within society (i.e., social capital; Putnam, 2000). Societies in which the government is efficient and citizens have higher social capital also tend to report stronger trust in government (Tyler, 2001, 2006; Job, 2005; Blind, 2007; Keele, 2007).

The degree of trust in authorities has especially significant implications in emergency and risk situations, where norms about appropriate behavior are unclear, and events may unfold in unpredictable ways. For instance, individuals' lack of confidence in the governments' ability to handle terrorist attacks may seriously harm officials' efforts to shape public responses to such

attacks (Wray et al., 2006). Conversely, reliable communication that inspires confidence can help the government reduce anxiety and prevent harm among citizens (Covello, 2003; Wray et al., 2004).

In the health context, trust in authorities was associated with individuals' compliance with authorities' recommendations during the H1N1 2009 pandemic in both the United Kingdom (Rubin et al., 2009) and Italy (Prati et al., 2011). Similarly, research from Tang and Wong (2003) showed an association between a composite measure of trust in institutions (including the government's ability to control the spread of the infection) and the likelihood of wearing a face mask during the outbreak of the Severe Acute Respiratory Syndrome (SARS) in Hong Kong. More recently, Morse et al. (2016) demonstrated that distrust in authorities was associated with reduced usage of health services in Liberia during the Ebola outbreak (2014–2016). In the present study, we tested the role of trust in the governments' ability to handle the current COVID-19 pandemic by comparing three different countries. We also investigated the cultural values that predicted trust in each of the three settings.

## Self-Conscious Emotions: Guilt and Shame in Response to Infection

Research has yet to examine the role of emotions in individuals' compliance with authorities' recommendations in the course of an epidemic outbreak (cf. Prati et al., 2011). Especially relevant in the context of diseases and infections are self-conscious emotions of guilt and shame. Individuals experience guilt or shame when they perceive they have done something wrong, or in response to stigma and blame (Giner-Sorolla, 2012). Although similar, guilt and shame refer to two different appraisals of the self (Lewis, 1971). Individuals feel guilt when they feel responsible for the consequences of a specific action, such as acting in ways that may increase the likelihood of contracting the coronavirus. Instead, shame involves an appraisal of the self as immoral and unworthy (Giner-Sorolla, 2012). Whereas guilt is generally defined as a private emotion, shame is theorized as externally driven (see Benedict, 1946; Wolf et al., 2010). This is because guilt implies a negative evaluation of the self by *oneself*, whereas shame implies a negative assessment of the self by *others*.

Guilt and shame play an essential role in shaping individuals' health-related decisions in various settings (Donahue and McGuire, 1995; Finerman and Bennett, 1995). These emotions have been examined in the context of multiple conditions, such as sexually transmitted diseases (Goldenberg et al., 2008), cancer (Chapple et al., 2004), type 2 diabetes (Browne et al., 2013), and obesity (Conrad et al., 2008). For instance, concerning sexually transmitted diseases, these emotions are associated with lower disclosure to partners, and lower intentions to seek treatment or testing (Cunningham et al., 2002; Balfe et al., 2010). Moreover, lung cancer patients may perceive guilt and shame about the disease, with significant impact on their intentions to disclose the disease or seek support (e.g., Chapple et al., 2004).

In this research, we investigated the role of guilt and shame in the context of individuals' responses to the COVID-19 pandemic.

Groups may tighten their norms when confronting ecological threats such as outbreaks of diseases (Gelfand et al., 2011; Gelfand et al., 2017). Tighter norms are beneficial because they foster group coordination, sustaining collective efforts (Gelfand et al., 2021). However, tighter norms may also encourage the stigmatization of those perceived as undermining them. For example, across many countries, several social media campaigns stigmatize individuals who were perceived as defying social distancing norms. Moreover, there is anecdotal evidence that contracting the infection leads to the stigmatization of the survivors (Maslin Nir, 2020), and blame toward them (Reicher and Drury, 2021).

## The Present Research

To summarize, this research investigated the role of trust and self-conscious emotions in predicting individuals' intentions to comply with social distancing norms and to report the infection to either health authorities or acquaintances. We examined these factors in three contexts (the United States, Italy, and South Korea) characterized by different prevalent cultural themes of HI and VI, and HC and VC. Moreover, we examined the role of individuals' cultural orientations within each country.

Concerning shame and guilt, research differentiating between the two emotions suggest that shame has mostly negative implications and is associated with avoidance and withdrawal, whereas guilt is associated with more positive coping and engagement (Tangney and Fischer, 1995; Tangney, 1998; Conrad et al., 2008). These findings suggest that shame should be associated with lower compliance and intentions to report the infection to authorities and others. In contrast, guilt may have fewer negative implications and even be associated with more substantial compliance and reporting.

We investigated differences in the role of shame and guilt across countries. Research suggests that self-conscious emotions are more prevalent, socially constructive, and have fewer negative implications for individuals' well-being and behavior in contexts characterized by higher collectivistic values and influenced by Confucianism (Menon and Shweder, 1994; Kitayama et al., 1997; Fischer et al., 1999; Li and Wang, 2004; Wong and Tsai, 2007). This is because these emotions are broadly consistent with the culturally sanctioned goals of self-improvement and adherence to collective standards and norms. In contrast, in individualistic contexts, shame and guilt are seen as negative emotions that should be avoided, and they are thus less socially constructive. This evidence suggests that VC, which emphasizes duties and obligations toward group goals, should predict stronger self-conscious emotions concerning the infection. Conversely, HC, which emphasizes equality and interdependence should predict lower levels of self-conscious emotions. Moreover, such emotions (and particularly shame) should have more substantial negative implications in more individualistic countries where VC is not the dominant value.

Concerning trust, we predicted a positive association between trust toward the government's efforts to tackle the pandemic and individuals' intentions to comply with social distancing norms and report the infection to health authorities (e.g., Tang and Wong, 2003; Rubin et al., 2009;

Prati et al., 2011; Morse et al., 2016). This is because higher trust in the government means that individuals are more likely to believe in the competence and good faith of the governments' recommendations, and abide by its regulations (Tyler, 2001).

However, the meaning and implications of trust may be shaped by culture (Shin and Park, 2004; Yuki et al., 2005). Cross-cultural research indicates that the association between trust and individualism and collectivism is complex and multifaceted, owing to the very different operationalizations of these constructs adopted within the literature (see Realo and Allik, 2009). Definitions of individualism that emphasize competition and narrow self-interest (similar to VI) suggest that individualism may have negative implications for trust (Putnam, 2000; Gelfand et al., 2004). However, evidence from cross-country comparisons indicates that individualism (conceptualized as autonomy and self-sufficiency, closer to HI) is associated with stronger (rather than weaker) interpersonal trust (Allik and Realo, 2004; Realo and Allik, 2009). There is also some evidence pointing at the relevance of horizontality and collectivism in fostering the emergence of trust. For instance, Realo et al. (2008) found that countries that scored higher on institutional collectivism – the extent to which institutional arrangements favor collective action (Gelfand et al., 2004) – displayed higher levels of social capital, an essential component of trust in government (Job, 2005).

At the individual level, research by Beilmann and Realo (2012) indicates that social capital is positively associated with two components of collectivism (i.e., relationships with peers, and dedication to the nation), as well as one of individualism (i.e., mature self-responsibility; Job, 2005). Similarly, research shows that the HC orientation – which encompasses values such as benevolence toward others and interdependence – is a predictor of generalized trust (Shin and Park, 2004). In the narrower context of trust toward the authorities, there is also some evidence of an association between VC and authority endorsement in crisis communication (Jakubanecs et al., 2018). This evidence can be explained by the fact that the VC orientation emphasizes respect for authority (see Devos et al., 2002). These findings suggest that both HC and VC may be relevant in predicting trust.

In the analyses, we tested our hypotheses controlling for gender and age due to the samples' heterogeneity included in the analyses. Moreover, we added political orientation (left-right) as a covariate to control for individuals' stance toward the current government. Finally, because countries experienced different infection rates, we controlled for individuals' perceived danger related to the spread of the virus within the country.

## MATERIALS AND METHODS

### Participants and Procedure

Five-hundred-and-ninety-seven participants were recruited from the United States (296 men, 291 women, 7 other, 3 preferred not to answer;  $M_{\text{age}} = 39.35$ ,  $SD_{\text{age}} = 11.62$ ). Of the American participants, 43.6% indicated they lived in a city/large town, 42.4% in a smaller/average town, 14.1% in a village/rural area. Participants were from different states, including Florida (9.7%),

New York (8.4%), California (7.7%), Texas (6.5%), Pennsylvania (5.4%), and Ohio (5.4%). The other states represented in the sample each accounted for <5% of the total number of participants.

Six-hundred-and-six participants were recruited from Italy (301 men, 294 women, 8 other, 3 preferred not to answer;  $M_{\text{age}} = 26.94$ ,  $SD_{\text{age}} = 7.72$ ). Of the Italian participants, 41.1% indicated they lived in a city/large town, 40.4% smaller/average town, 18.5% village/rural. Participants were from different regions, including Piemonte (21.8%), Lazio (14.7%), Lombardia (10.7%), Veneto (8.9%), Campania (8.7%), Sicilia (6.6%), and Emilia Romagna (5.9%). The other regions represented in the sample each accounted for <5% of the Italian sample.

Six-hundred-and-ninety-three participants were recruited from South Korea (342 men, 346 women, 5 preferred not to answer;  $M_{\text{age}} = 44.46$ ,  $SD_{\text{age}} = 13.15$ ). Of the Korean participants 81.8% indicated they lived in city/large town, 16.2% in a smaller/average city, and only 2% in a village/rural area. Participants were from different metropolitan cities and provinces, including Seoul (28.6%), Busan (16.0%), Incheon (14.9%), Daegu (12.4%), Gyungi (8.7%), Gwangju (7.1%), and Daejeon (6.3%). The other regions represented in the sample each accounted for <5% of the Korean sample.

Data from the United States and Italy were collected using Qualtrics via Prolific Academic© (see Peer et al., 2017). Data from Korea were collected using Qualtrics via a local research panel. The studies involving human participants were reviewed and approved by the Psychology Ethics Committee of Leeds Beckett University. Participants were paid 2 GBP in Italy and the United States, and 2.25 GBP in Korea.<sup>1</sup> All scales included for the present study were initially developed in English and subsequently translated into Italian and Korean. Back-translation was used to achieve equivalent meanings in the two languages following guidelines by Brislin (1986).

Participants were invited to participate in a larger research study on “political and current issues” which also included a module on the “the current COVID-19 situation.” Items were presented to participants in random order. After completing the measures, all participants were debriefed in writing, thanked, and compensated for their time. Data in all countries were collected between April 6th and 8th 2020 (the COVID-19 outbreak was declared a Public Health Emergency of International Concern on January 30, 2020). At that time, the United States had reported 12,895 deaths due to COVID19, Italy 17,129 and Korea 200. According to the University of Oxford's Stringency index, the three countries had 72.69/100, 91.67/100, and 82.41/100 stringency levels between April 6th and 8th. The Stringency Index is a measure of the severity of the government's responses to the pandemic. The index is a composite measure of seven indicators rescaled to vary from 0 to 100 (Hale et al., 2020). A higher number means that more restrictions are in place in a given country (see Hale et al., 2020 for details).

<sup>1</sup>Participants were paid in USD, EUR, and WON, respectively. Here we report prices converted in GBP.



## Measures

### Horizontal and Vertical Individualism and Collectivism

Twelve items drawn from Sivadas et al.'s (2008) 14 item-scale were used to measure HI (3 items; e.g., *I enjoy being unique and different from others in many ways*), VI (3 items; e.g., *I enjoy working in situations involving competition with others*), HC (3 items; e.g., *The well-being of my co-workers is important to me*), and VC (3 items; e.g., *I would do what would please my family, even if I detested that activity*).<sup>2</sup> Participants answered items using a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). The structure of the short scale of horizontal and VI and collectivism has been validated in four contexts (Sivadas et al., 2008) and further confirmed by a recent cross-cultural study (Moon et al., 2018).

### Shame and Guilt

Feelings of shame and guilt were measured using one item for each emotion. Participants were asked to indicate the extent to which they would feel ashamed and guilty if they became infected with the new coronavirus COVID-19 (1 = *not at all*, 7 = *very much*).

### Trust in Governments

Participants indicated the extent to which they agreed or disagreed with a statement "I trust how the government of my country is handling the spread of the coronavirus" using a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*).

### Compliance With Social Distancing

Using six items, we measured the extent to which people complied with standard guidelines indicating how to behave during the COVID-19 emergency. The items were "I avoid leaving my home unnecessarily," "I wash my hands often," "I follow instructions from health authorities," "I stay away from crowded places," "I advise others about how to act in response to the virus," and "I stand away from others in public places" (1 = *not at all*, 7 = *very much*).

### Self-Reporting of the Infection to Authorities and Acquaintances/Friends

Participants reported their intentions to report the infection to health authorities and acquaintances/friends. Participants first read "if I suspected I were infected with the new coronavirus. . ." and answered two items "I would notify the health authorities immediately" "I would hide it from my acquaintances and friends" (1 = *not at all*, 7 = *certainly*).

### Concerns About the Virus

Using a 7 point scale, participants indicated how concerned they were by the spread of the new coronavirus (COVID-19) in their country (1 = *not at all concerned*, 7 = *extremely concerned*).

<sup>2</sup>In the present study, we did not include the two items "My happiness depends very much on the happiness of those around me" and "Children should feel honored if their parents receive a distinguished award" from Sivadas et al.'s (2008) scale because these items had inconsistent loadings in previous cross-cultural research involving samples from the United States and Korea (Moon et al., 2018).

## Political Orientation

Participants indicated how they would describe themselves considering their country's current political context using a 100-point scale slider (0 = *I am a left-winger*, 100 = *I am a right-winger*). Political orientation was added as a covariate to the model.

## Analytical Strategy and Statistical Power

Data were analyzed using structural equation models with latent and observed variables. Analyses were performed using R with the lavaan (Rosseel, 2012), semTools (Jorgensen et al., 2019), and cpsych (Fischer and Karl, 2019) packages. The recommended sample size to be able to detect a minimum small-to-medium effect size ( $\delta = 0.2$ ) at 80% power and  $\alpha = 0.05$  in a model with 5 latent and 27 observed variables is  $N = 376$  (Soper, 2019).

We first sought to establish measurement invariance across countries for the latent measures included in the final model (He and van de Vijver, 2012; Fischer and Karl, 2019). Measurement invariance indicates that a construct is interpreted similarly by respondents in different groups (i.e., cultures, nations, etc.) and can thus be meaningfully compared. Specifically, using a confirmatory factor analysis and robust standard errors, we tested measurement invariance of the 12-item horizontal and vertical individualism and collectivism (HVIC) scale, and the 6-item compliance scale. For each scale separately, we first tested the configural invariance models to examine whether all items loaded on the respective latent factors across countries. These models were then compared to models where factor loadings were constrained to be equal across countries (i.e., metric invariance). Finally, we fixed intercepts to test for scalar invariance. We sought to establish partial invariance for models that did not achieve full invariance. Partial invariance involves individuating what loading(s) or intercept(s) are causing misfit, thus allowing them to vary freely across the groups compared. Partial invariance (with at least two invariant indicators) is often considered a more realistic and sufficient goal in cross-cultural research (cf. Steinmetz, 2018).

Overall model fit was evaluated using four indices, comparative fit indices (CFI: acceptable  $\geq 0.95$ , excellent  $\geq 0.97$ ), adjusted goodness of fit index (AGFI: acceptable  $\geq 0.90$ , excellent  $\geq 0.95$ ), Root Mean Square Error of Approximation (RMSEA; acceptable  $\leq 0.10$ , excellent  $\leq 0.05$ ) and Standardized Root Mean Square Residual (SRMR; acceptable  $\leq 0.10$ , excellent  $\leq 0.05$ ; Hu and Bentler, 1998; Schermelleh-Engel et al., 2003). We also report  $\chi^2$ , although it should be noted that this index is less reliable due to its dependency on multivariate normality and sample size (Schermelleh-Engel et al., 2003). Invariance was determined by examining whether the CFI difference between the constrained nested models was higher than the recommended threshold of  $\Delta CFI = 0.01$  (Cheung and Rensvold, 2002).

Subsequently, to test the hypotheses, we estimated a multi-group structural equation model in which self-conscious emotions of shame and guilt, and trust were predicted by the four cultural dimensions of HI, VI, HC, and VC across countries. Self-conscious emotions and trust, in turn, predicted compliance, intentions to report the infection to health



authorities and acquaintances/friends. Gender, age, concern about the spread of the virus and political orientation were added as covariates to the model.

First, we estimated the latent means using the marker method (Little et al., 2006). We fixed the intercept of each factor's marking item to zero in order to estimate the latent means and interpret them using the same scale as the marker items. Next, we compared means across countries. Finally, we proceeded to examine differences across countries in the model structural paths using the scaled difference Chi-square tests (Satorra and Bentler, 2001).

## RESULTS

### Measurement Invariance

The configural model of the HVIC scale had good fit,  $\chi^2$  (144,  $N = 1896$ ) = 394.34,  $p < 0.001$ , CFI = 0.95, AGFI = 0.99, RMSEA = 0.05, SRMR = 0.05. Constraining the loadings to be equal across groups did not cause the model to deteriorate significantly, indicating that metric invariance was achieved across countries,  $\Delta$ CFI = 0.005 (Cheung and Rensvold, 2002). However, fixing intercepts across countries caused the model fit to deteriorate more than the recommended threshold ( $\Delta$ CFI = 0.04), suggesting that the model did not achieve scalar invariance. Thus, we sought to establish partial scalar invariance by examining what intercepts were the source of the misfit in the model. Releasing the intercepts of two items ("I enjoy working in situations involving competition with others" and "I usually sacrifice my self-interest for the benefit of my group") to vary freely across countries resulted in a model with partial scalar invariance ( $\Delta$ CFI = 0.009).

Analogously, we tested for invariance across countries for the compliance measure. The six-item scale demonstrated acceptable fit across groups,  $\chi^2$  (24,  $N = 1896$ ) = 59.557,  $p < 0.001$ , CFI = 0.98, AGFI = 0.99, RMSEA = 0.07, SRMR = 0.03. The model's fit did not deteriorate significantly when we constrained intercepts to be equal across countries ( $\Delta$ CFI = 0.009). However, the model did not achieve full scalar invariance ( $\Delta$ CFI = 0.029). Therefore, we established partial scalar invariance by releasing the intercepts of the items, "I wash my hands often" and "I stand away from others in public places."

### Primary Analyses: Comparisons Across Countries

Zero-order correlations, means, standard deviations, and alpha coefficients for measures across countries are summarized in **Table 1**. The indices of AGFI = 0.99, RMSEA = 0.05, SRMR = 0.06 indicated good fit. CFI was below the recommended threshold of acceptability (=0.91) and  $\chi^2$  (806,  $N = 1896$ ) = 1794.92,  $p < 0.001$  was significant. Overall, we judged the model fit adequate and retained this model for cross-country comparisons.

### Latent Means

The measurement models of the latent variables were constrained to be partially invariant across countries to enable comparisons of latent means across groups. Results of latent means comparisons

using the market method are summarized in **Table 2**. Participants in the United States endorsed HI and VI significantly more strongly than participants in Korea. Italian participants did not differ significantly from those in the United States and Korea in their endorsement of HI and VI but endorsed HC significantly more strongly than participants in either country. Participants in Korea endorsed VC more strongly than Italian or United States participants. Moreover, participants reported stronger compliance with social distancing norms in Italy, followed by the United States and then Korea.

### Structural Paths

Fixing all the structural paths (except the covariates) to be the same across countries produced a significantly worse fit,  $\Delta\chi^2(42) = 67.954$ ,  $p = 0.006$ . This result suggested the presence of differences between some of the paths. To examine these differences, we proceeded by systematically constraining one path at the time to be equal across countries. Fixing the effects of the HI, HC, VI and VC paths on shame [ $\Delta\chi^2(2) < 5.57$ ,  $p > 0.06$ ] or guilt [ $\Delta\chi^2(2) < 4.91$ ,  $p > 0.08$ ] across countries did not produce a significantly worse fit. Similarly, fixing the effects of HI and VC on trust did not worsen the fit significantly [ $\Delta\chi^2(2) < 4.04$ ,  $p > 0.13$ ], but fixing either paths between HC [ $\Delta\chi^2(2) < 7.64$ ,  $p = 0.02$ ] or VC [ $\Delta\chi^2(2) < 12.14$ ,  $p = 0.002$ ] and trust produced a significantly worse fit. Thus, these paths were allowed to vary freely.

Next, fixing the paths between shame [ $\Delta\chi^2(2) < 2.96$ ,  $p > 0.22$ ] or guilt [ $\Delta\chi^2(2) < 0.56$ ,  $p > 0.75$ ] and compliance, intentions to report the infection to authorities, or acquaintances/friends did not produce a significantly worse fit. Only the path between trust and compliance [ $\Delta\chi^2(2) < 16.17$ ,  $p < 0.001$ ] was allowed to vary freely across countries, whereas the path between trust and intentions to report the infection to authorities or acquaintances/friends [ $\Delta\chi^2(2) < 2.43$ ,  $p > 0.29$ ] were fixed. The resulting model with the freed paths specified above had no significantly worse fit than the model where all paths were free to covary [ $\Delta\chi^2(36) < 36.43$ ,  $p = 0.454$ ;  $\chi^2$  (842,  $N = 1896$ ) = 1834.27,  $p < 0.001$ , AGFI = 0.99, RMSEA = 0.05, SRMR = 0.06]. The model unstandardized solution is comparable across groups (Kline, 2015) and is summarized in **Figure 1**. Within groups completely standardized solutions for each country are reported in **Table 3**.

Guilt and shame were negatively predicted by HC and positively predicted by VC across countries. Interestingly, HC significantly and positively predicted trust only in Italy ( $b = 0.22$ ,  $p = 0.02$ ) and Korea ( $b = 0.33$ ,  $p < 0.001$ ). In the United States, trust was predicted by VC ( $b = 0.29$ ,  $p < 0.001$ ). There were some smaller but significant associations between VI and shame ( $b = 0.09$ ,  $p = 0.01$ ), and VI and trust ( $b = 0.12$ ,  $p = 0.04$ ). There was no significant association between HI and other constructs, but only a marginally significant association ( $p = 0.054$ ) with trust.

Shame negatively predicted compliance and individuals' intentions to report the infection to authorities and positively predicted individuals' intentions to hide the disease from acquaintances/friends. Conversely, stronger guilt was positively associated with individuals' intentions to report the disease

**TABLE 1** | Correlations, Means, standard deviations, and Cronbach's alpha between study variables separately for each cultural group.

Measure	$\alpha_{\text{tot}}$	$\alpha_{\text{US}}$	$\alpha_{\text{IT}}$	$\alpha_{\text{KR}}$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1. HI	0.77	0.78	0.65	0.73	–														
2. HC	0.77	0.79	0.79	0.71	0.31*** (0.23***) 0.07 (0.24***)	–													
3. VI	0.74	0.78	0.69	0.68	0.09*** (0.11**) 0.25*** (0.23***)	–0.02 (–0.04)	–												
4. VC	0.79	0.77	0.74	0.77	–0.14*** (–0.10*) –0.07 (0.04)	0.05* (0.16***) 0.03 (0.35***)	0.26*** (0.19***) 0.14*** (0.34***)	–											
5. Shame	–	–	–	–	–0.20*** (0.03) –0.05 (–0.01)	–0.22*** (–0.09*) –0.15** (0.03)	0.16*** (0.09*) 0.05 (0.08*)	0.26*** (0.16***) 0.07 (0.13**)	–										
6. Guilt	–	–	–	–	–0.18*** (–0.00) –0.04 (–0.02)	–0.15*** (–0.02) –0.06 (0.04)	0.11*** (0.10*) –0.00 (0.02)	0.23*** (0.22***) 0.09* (0.12**)	0.71*** (0.72***) 0.57*** (0.69***)	–									
7. Trust	–	–	–	–	–0.11*** (–0.01) 0.05 (0.07)	–0.01 (–0.03) 0.15*** (0.20***)	0.14*** (0.26***) 0.06 (–0.01)	0.10*** (0.26***) 0.02 (0.02)	0.10*** (0.05) –0.01 (0.02)	0.15*** (0.01) 0.07 (0.09*)	–								
8. Compliance	0.82	0.76	0.69	0.86	0.23*** (0.08) 0.12** (0.11**)	0.39*** (0.36***) 0.26** (0.27***)	–0.06* (–0.11**) 0.05 (0.13***)	–0.05 (0.09*) –0.01 (0.16***)	–0.19*** (–0.04) –0.06 (0.06)	–0.08*** (0.05) 0.06 (0.08*)	0.02 (–0.06) 0.19*** (0.21***)	–							
9. Self-reporting	–	–	–	–	0.08*** (0.11*) 0.01 (0.11*)	0.21*** (0.27***) 0.19*** (0.19***)	0.01 (0.01) 0.04 (0.04)	0.00 (0.12**) –0.02 (0.05)	–0.08*** (–0.02) –0.14** (–0.04)	0.02 (0.05) –0.01 (0.04)	0.19*** (0.09*) 0.16*** (0.14***)	0.32*** (0.35***) 0.24*** (0.34***)	–						

(Continued)

TABLE 1 | Continued

Measure	$\alpha_{tot}$	$\alpha_{US}$	$\alpha_{IT}$	$\alpha_{KR}$	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
10. Hiding	-	-	-	-	-0.13*** (0.04)	-0.27*** (-0.17***)	0.10*** (0.07)	0.16*** (0.06)	0.38*** (0.31***)	0.28*** (0.25***)	0.04 (0.05)	-0.24*** (-0.15***)	-0.19*** (-0.19***)	-						
					-0.02 (-0.01)	-0.18*** (-0.17***)	0.05 (-0.01)	0.07 (0.03)	0.29*** (0.21***)	0.17*** (0.15***)	-0.04 (-0.06)	-0.17*** (-0.10*)	-0.25*** (-0.15***)							
11. Age	-	-	-	-	-0.22*** (-0.04)	-0.10*** (0.04)	0.12*** (-0.08)	0.29*** (0.03)	0.20*** (-0.22***)	0.04 (-0.25***)	-0.03 (0.11**)	-0.08** (0.08*)	-0.08*** (0.06)	0.14*** (-0.12**)	-					
					0.02 (-0.21***)	-0.09* (0.15***)	0.06 (0.14***)	0.19*** (0.24***)	-0.03 (0.09*)	-0.08* (-0.03)	-0.08* (0.02)	0.07 (0.16***)	0.07 (-0.05)	-0.03 (0.04)						
12. Gender	-	-	-	-	0.04 (0.04)	0.10*** (0.23***)	-0.21*** (-0.24***)	-0.11*** (-0.06)	0.00 (0.01)	0.05* (0.02)	-0.01 (-0.08*)	0.14*** (0.17***)	0.05 (0.06)	-0.00 (-0.04)	-0.00 (0.12**)	-				
					-0.02 (0.08*)	0.15*** (-0.02)	-0.27*** (-0.13**)	-0.08* (-0.19***)	0.00 (0.01)	0.07 (0.08*)	0.02 (0.06)	0.15*** (0.14***)	0.01 (0.01)	-0.03 (0.04)	-0.02 (-0.09*)					
13. PD	-	-	-	-	0.03 (-0.02)	0.20*** (0.30***)	-0.02 (0.14***)	0.13*** (0.16***)	0.12*** (0.11**)	0.17*** (0.18***)	-0.17*** (-0.17***)	0.36*** (0.52***)	0.11*** (0.23***)	-0.05* (-0.13**)	0.15*** (0.14**)	0.14*** (0.17***)	-			
					-0.01 (0.05)	0.16*** (0.22***)	-0.07 (0.17***)	0.07 (0.12**)	0.31*** (0.18***)	0.04 (0.20***)	0.20*** (0.00)	0.16*** (0.12**)	0.34*** (0.10*)	-0.07 (-0.03)	0.10* (0.08*)	0.08* (0.08*)				
14. PO	-	-	-	-	-0.12*** (0.00)	-0.20*** (-0.12**)	0.34*** (0.31***)	0.25*** (0.20***)	0.20*** (0.07)	0.09*** (-0.30)	0.16*** (0.52***)	-0.22*** (-0.19***)	-0.07** (-0.03)	0.19*** (0.09*)	0.25*** (0.13**)	-0.12*** (-0.15***)	-0.05* (-0.24***)	-		
					0.08* (-0.08*)	-0.22*** (0.02)	0.34*** (0.23***)	0.17*** (0.14***)	-0.01 (0.10**)	-0.07 (0.05)	-0.18*** (-0.19***)	-0.10* (-0.06)	-0.01 (-0.10**)	0.07 (0.12**)	0.16*** (0.15***)	-0.19*** (-0.02)	-0.05 (0.14***)			
$M_{tot}$ (SD)	-	-	-	-	5.08 (1.14)	5.68 (0.91)	4.34 (1.29)	3.84 (1.24)	2.68 (1.89)	3.20 (1.99)	4.71 (1.76)	6.09 (0.84)	6.14 (1.48)	1.95 (1.56)	37.25 (13.82)	1.52 (0.55)	5.69 (1.42)	42.26 (25.12)		
$M_{USA}$ (SD)	-	-	-	-	5.56 (0.91)	5.95 (0.79)	4.17 (1.36)	3.84 (1.29)	2.18 (1.64)	2.53 (1.85)	3.43 (1.81)	6.27 (0.78)	5.78 (1.74)	1.70 (1.44)	39.35 (13.16)	1.53 (0.55)	5.99 (1.32)	38.39 (29.16)		
$M_{IT}$ (SD)	-	-	-	-	5.31 (0.96)	5.92 (0.81)	4.11 (1.40)	3.29 (1.19)	1.77 (1.28)	2.75 (1.83)	5.32 (1.38)	6.39 (0.61)	6.61 (0.93)	1.40 (0.97)	26.94 (7.72)	1.53 (0.55)	5.37 (1.54)	35.10 (22.75)		
$M_{KOR}$ (SD)	-	-	-	-	4.46 (1.19)	5.23 (0.92)	4.68 (1.04)	4.33 (1.02)	3.92 (1.88)	4.18 (1.85)	5.27 (1.41)	5.68 (0.91)	6.04 (1.52)	2.65 (1.81)	44.46 (13.15)	1.52 (0.54)	5.68 (1.35)	51.85 (19.83)		

Correlations between variables for the entire sample ( $N = 1896$ ), American ( $N = 597$ ), Italian ( $N = 606$ ), and Korean ( $N = 693$ ) participants are presented in order. Correlations for American and Korean participant are presented in parenthesis. For all scales, higher scores are indicative of more extreme responding in the direction of the construct assessed. HI, horizontal individualism; VI, vertical individualism; HC, horizontal collectivism; VC, vertical collectivism; PD, perceived danger; PO, political orientation; self-reporting, intentions to report contracting the disease to health authorities; hiding, intentions to hide contracting the infection from acquaintances and friends. \*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .

to authorities. Finally, stronger trust positively predicted individuals' intentions to report the infection to authorities. However, trust was significantly associated with compliance only in Italy ( $b = 0.06, p < 0.001$ ) and Korea ( $b = 0.13, p < 0.001$ ).

We inspected the indirect effects from the cultural orientations of HI, VI, HC, and VC to the criterion variables via self-conscious emotions and trust. The indirect effects of HC via shame on compliance,  $b = 0.02, SE = 0.01, CI_{95\%} (0.004 \text{ to } 0.03)$ , self-reporting to health authorities,  $b = 0.03, SE = 0.01, CI_{95\%} (0.01 \text{ to } 0.06)$ , and hiding from acquaintances/friends,  $b = -0.07, SE = 0.02, CI_{95\%} (-0.10 \text{ to } -0.03)$  were significant. HC was also indirectly (and negatively) associated with self-reporting via guilt  $b = -0.01, SE = 0.01, CI_{95\%} (-0.02 \text{ to } -0.001)$ . The indirect effects of VC via shame on compliance,  $b = -0.01, SE = 0.003, CI_{95\%} (-0.014 \text{ to } -0.002)$ , self-reporting,  $b = -0.02, SE = 0.01, CI_{95\%} (-0.03 \text{ to } -0.01)$ , and hiding,  $b = 0.04, SE = 0.01, CI_{95\%} (0.02 \text{ to } 0.06)$ , were also significant (and in the opposite directions, compared to HC). There was a positive indirect effect of VC via guilt on self-reporting,  $b = 0.01, SE = 0.01, CI_{95\%} (0.003 \text{ to } 0.03)$ . None of the indirect effects of VI were significant.

Finally, with regard to trust, the indirect effects of HC via trust on compliance was significant in the Italian  $b = 0.02, SE = 0.01, CI_{95\%} (0.01 \text{ to } 0.03)$  and Korean samples,  $b = 0.04, SE = 0.01, CI_{95\%} (0.01 \text{ to } 0.07)$ . The indirect effect of HC on self-reporting via trust was significant only in the Korean sample  $b = 0.04, SE = 0.01, CI_{95\%} (0.01 \text{ to } 0.06)$ . In the United States, the indirect effect of VC on self-reporting via trust was significant,  $b = 0.03, SE = 0.01, CI_{95\%} (0.01 \text{ to } 0.05)$ . Other indirect effects were not statistically significant.

## DISCUSSION

In this research, we investigated how trust in government and self-conscious emotions of shame and guilt explained individuals' compliance with social distancing, and their intentions to report the infection to health authorities or acquaintances/friends. These associations were investigated in three countries characterized by different cultural themes (the United States, Italy, and Korea). In each country, we also measured individuals' cultural orientations. Results indicated the existence of cultural similarities across contexts. Differences mostly emerged with regard to trust.

In all three countries, feelings of shame at the idea of contracting the virus were negatively associated with compliance and individuals' self-reporting intentions. These associations emerged regardless of the overall cultural theme of the country, suggesting that they are stable across cultures. The findings suggest that stigmatizing or blaming individuals for contracting the infection could potentially backfire.

Several recent episodes reported in the news or on social media imply the existence of stigmatizing attitudes toward people who are perceived as flaunting lockdown rules and social distancing norms. For instance, hashtags such as "covidiot" (a portmanteau combining the words "covid-19" and "idiots") are used on Twitter to mock or blame individuals who do not abide by the norms (Reicher and Drury, 2021). Moreover, there are

**TABLE 2** | Latent means and standard errors in the structural equation model.

	United States (SE)	Italy (SE)	South Korea (SE)
Horizontal individualism	5.41 <sup>a</sup> (0.26)	5.09 <sup>a,b</sup> (0.26)	4.62 <sup>b</sup> (0.31)
Horizontal collectivism	4.77 <sup>a</sup> (0.26)	5.87 <sup>b</sup> (0.19)	4.28 <sup>a</sup> (0.25)
Vertical individualism	4.36 <sup>a</sup> (0.28)	3.85 <sup>a,b</sup> (0.24)	3.38 <sup>b</sup> (0.20)
Vertical collectivism	2.11 <sup>a</sup> (0.34)	1.70 <sup>a</sup> (0.29)	3.57 <sup>b</sup> (0.26)
Compliance	4.76 <sup>a</sup> (0.28)	5.82 <sup>b</sup> (0.17)	2.94 <sup>c</sup> (0.29)

Means that do not share a superscript within each row are significantly different at  $p \leq 0.05$ . Means were estimated using the marker method and are therefore interpretable on a 1 to 7 scale.

anecdotal reports of people being attacked, insulted or publicly shamed because they were found walking in the streets during the lockdown. The president of an Italian region even asked for lists of violators to be made public, intending to shame transgressors (Pellegrino, 2020). Such discourses and actions are unlikely to have positive implications for individuals' willingness to abide by the new norms. Instead, feelings of shame could even limit the authorities' ability to trace and test new cases, or acquaintances' and friends' ability to know about potential contacts with infected individuals.

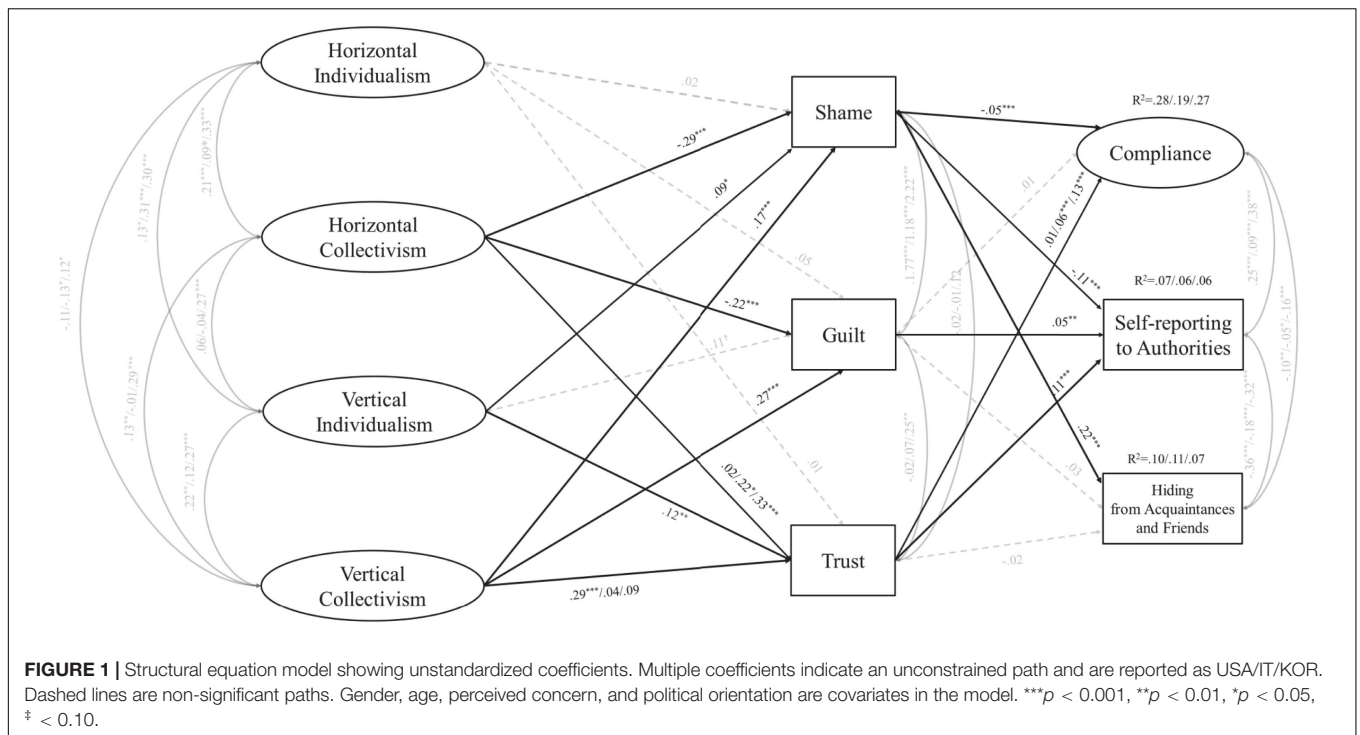
Results about shame were obtained controlling for the effects of guilt. Conversely, the only effect of guilt independent of shame was a positive association between guilt and individuals' intentions to report the infection to authorities. This finding is congruent with previous research suggesting that guilt may foster more constructive responses to transgressions (Tangney and Fischer, 1995). Notably, however, guilt explained less overall variance compared to shame.

Finally, the hypothesized association between trust in government and compliance was statistically significant only in Italy and South Korea. In contrast, the association in the United States was closer to zero and non-statistically significant. Although we controlled for participants' political orientation, this pattern of associations could reflect the political situation in the United States at the time of the study, where the Republican-led central government had been notably slow in its responses to the pandemic, sending out contradictory signals to the public and undermining the experts' recommendations (cf. Mirvis, 2020). Nonetheless, the association between trust and self-reporting did not differ significantly across countries, indicating that individuals who trust the government's handling of the pandemic are more likely to report the infection to authorities.

## Cultural Orientations and Cross-Cultural Comparisons

The pattern of means of the cultural orientations of HI, HC, VI, and VC suggested that overall levels of individualism were higher in the United States than Korea and that the Italian sample fell between these two countries. Whereas Korean participants reported higher levels of VC than other groups, Italian participants reported higher HC levels. Within countries, however, there were strong similarities concerning the role of cultural orientations.





**TABLE 3 |** Within groups completely standardized solutions for coefficients in the study.

Paths	United States		Italy		South Korea		Paths	United States		Italy		South Korea	
	$\beta$	SE	$\beta$	SE	$\beta$	SE		$\beta$	SE	$\beta$	SE	$\beta$	SE
HC → shame =	-0.13***	0.07	-0.17***	0.07	-0.14***	0.07	Shame → compliance =	-0.11***	0.03	-0.14***	0.01	-0.10***	0.01
HI → shame =	0.01	0.05	0.01	0.05	0.01	0.05	Guilt → compliance =	0.05	0.02	0.03	0.02	0.01	0.01
VI → shame =	0.06*	0.04	0.08*	0.04	0.04*	0.04	Trust → compliance =	0.12	0.02	0.19***	0.02	0.18***	0.03
VC → shame =	0.13***	0.04	0.15***	0.04	0.09***	0.04	Shame → self-reporting =	-0.11***	0.03	-0.16***	0.03	-0.14***	0.03
HC → guilt =	-0.09***	0.07	-0.09***	0.07	-0.11***	0.07	Guilt → self-reporting =	0.05**	0.02	0.10**	0.02	0.06**	0.02
HI → guilt =	-0.03	0.06	-0.03	0.06	-0.03	0.06	Trust → self-reporting =	0.12***	0.02	0.17***	0.02	0.10***	0.02
VI → guilt =	0.07	0.06	0.07	0.06	0.05	0.06	Shame → hiding =	0.26***	0.03	0.29***	0.03	0.23***	0.03
VC → guilt =	0.19***	0.05	0.17***	0.05	0.14***	0.05	Guilt → hiding =	0.04	0.02	0.05	0.02	0.03	0.02
HC → trust =	0.01	0.12	0.12*	0.10	0.20***	0.09	Trust → hiding =	-0.03	0.02	-0.03	0.02	-0.02	0.02
HI → trust =	0.001	0.05	0.001	0.05	0.01	0.05							
VI → trust =	0.08**	0.05	0.10**	0.05	0.07**	0.05							
VC → trust =	0.21***	0.07	0.04	0.06	-0.06	0.08							

HI, horizontal individualism; HC, horizontal collectivism; VI, vertical individualism; VC, vertical collectivism; self-reporting, intentions to disclose contracting the disease to health authorities; hiding, intentions to hide contracting the disease from acquaintances and friends; =, indicates structural paths constrained to be invariant across groups; \*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .

Vertical collectivism (and to a lesser extent VI) was positively associated with individuals' feelings of shame at the thought of contracting the disease. This resulted in a negative indirect effect of VC on compliance and intentions to report the infection to authorities and acquaintances/friends. Conversely, HC was negatively associated with shame. HC may be less conducive to stigma concerning the infection, thus creating a positive indirect effect on compliance and self-reporting intentions. There were also significant associations between VC, HC and guilt. Individuals who endorsed VC were also more likely to report stronger guilt concerning the infection.

Conversely, those who endorsed HC reported lower feelings of guilt. This pattern of associations created contrasting indirect effects of VC and HC on individuals' intentions to report the disease to authorities. Specifically, the indirect effect of HC on self-reporting intentions via guilt was negative, whereas that of VC was positive.

The findings highlight the relevance of individuals' cultural orientations in their responses to the pandemic. Across countries, participants who valued vertical relationships were more likely to perceive stronger self-conscious emotions. Instead, valuing horizontal relationships was associated with weaker

self-conscious emotions. These emotions, in turn, predicted different responses to the disease. Shame was associated with less constructive (from the perspective of the group) responses, whereas guilt was linked to a higher likelihood of reporting the infection to authorities. The values of individualism (whether horizontal or vertical) were overall less relevant, and HI and VI's indirect effects were non-statistically different from zero.

The larger difference across countries concerned the articulation between cultural orientations, trust and individuals' responses to the virus. Research on the association between cultural orientations and trust indicates the existence of a complex and multifaceted relationship among these constructs (e.g., Shin and Park, 2004; Realo and Allik, 2009). Our results indicated that in Italy and South Korea, individuals who endorsed the HC orientations were also more likely to trust the governments. This finding is in line with previous research emphasizing the importance of values of interdependence in predicting generalized trust (Shin and Park, 2004). This finding also highlights the fact that trust in government does not depend only on government performance (Keele, 2007), which likely varied across countries. Rather, our findings highlight the relevance of valuing cohesive relationships for individuals' trust toward the government (Job, 2005). Consistent with this idea, there was an indirect effect of HC on compliance via trust in both Italy and Korea. HC's indirect effect on self-reporting intentions was instead significant only in Korea, a result likely due to the stronger association between HC and trust in this country.

Differently from Italy and South Korea, VC predicted stronger trust in the government in the United States. Trust in government's action was not significantly associated with greater compliance with social distancing norms in that country. At the time of the study, the federal administration had emphasized the importance of loyalty, deference to authority and an "America first" policy. It has also repeatedly signaled its contempt for scientific advice or social distancing norms. For instance, President Trump stated (via social networks) his support for protesters who openly defied lockdown orders in Michigan or elsewhere. This political response might explain why VC values predicted individuals' trust for the government in the United States. Notably, however, the association between VC and trust was significant independently from individuals' political orientation or concern for the spread of the coronavirus within the country, underlining cultural orientations' relevance *vis-à-vis* trust.

## LIMITATIONS, FUTURE DIRECTIONS, AND CONCLUSION

This research is the first to report evidence for the roles of self-conscious emotions and trust in individuals' compliance and self-reporting intentions. We complemented current work on the pandemic by examining the relationships

between cultural orientations and these constructs across three countries (the United States, Italy and South Korea). Nonetheless, the research was affected by some limitations.

First, some constructs in the study, such as trust in the government and self-conscious emotions, were measured with single-item measures. The use of single-item measures offers practical advantages, such as reducing the survey's completion time and minimizing participants' drop-outs. Notably, single-item measures tend to have similar predictive validity to multiple-item measures when they tap constructs that are "singular" and can be "concretely imagined" by participants (Rossiter, 2002; Bergkvist and Rossiter, 2007). However, future research may consider the use of multiple-item measures, which enable researchers to examine the role of different facets of a construct (Churchill, 1979).

Another limitation of this study concerns the fact that some emotions relevant in the context of individuals' reactions to the pandemic were not measured. For example, it is likely that individuals' feelings of fear could play a role in their intentions to comply with social distancing, or report the disease to the authorities (e.g., Harper et al., 2020). Moreover, feelings of disgust may augment the sense of stigma or the stigmatization of those who have contracted the infection (e.g., Herek et al., 2002). A priority for future work is to consider the role of these, and other emotional reactions, in the context of the current pandemic, as well as cross-cultural similarities and differences in people's appraisals of the infection.

Finally, it should be noted that individualism and collectivism are complex "syndromes," encompassing a cluster of different beliefs, norms and practices as well as emphasizing different levels of self-construal (see Brewer and Chen, 2007). Whereas individualism has generally been associated with an independent self-construal, collectivism has been linked to an interdependent self-construal (Markus and Kitayama, 1991). Nonetheless, more recent work highlights that the relationship between individualism-collectivism and self-construal is multifaceted (Vignoles et al., 2006). A given cultural context may foster independence in a particular domain of the self, but interdependence in another domain. Thus, there are multiple different ways of being independent and interdependent. Future research should examine how different configurations of independence and interdependence are associated with trust in government and, indirectly, compliance with social distancing and self-reporting intentions.

To conclude, our findings indicate that attempting to deter people from defying social distancing by blaming or stigmatizing them may negatively impact public health. Results about guilt had slightly more positive implications. However, it is hard to separate feelings of guilt from those of shame, especially in some cultures (Wong and Tsai, 2007). Thus, governments and decision-makers may obtain better results by focusing on the importance of social cohesion and trustworthiness in their attempts to tackle the pandemic and manage public responses.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Psychology Ethics Committee of Leeds Beckett University. The participants provided their informed consent online prior to taking part in this study.

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GT and CM: manuscript writing, editing, and data analysis. Both authors contributed to the article and approved the submitted version.

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# Psychological Impact of the Lockdown in Italy Due to the COVID-19 Outbreak: Are There Gender Differences?

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The COVID-19 emergency has hit the whole world, finding all countries unprepared to face it. The first studies focused on the medical aspects, neglecting the psychological dimension of the populations that were forced to face changes in everyday life and in some cases to stay forcedly at home in order to reduce contagion. The present research was carried out in Italy, one of the countries hardest hit by the pandemic. The aim was to analyze the perception of happiness, mental health, and the sense of loneliness experienced by adults during the lockdown due to the COVID pandemic. Specifically, the variables will be examined in relation to gender difference, living alone, with partner, or with partner and children. The research followed a quantitative approach using an online questionnaire. The project involved 1100 subjects from whom 721 participants (75.5% women) were extrapolated. Of them, 17.3% claimed to live alone, 39.5% with their partner, and 43.1% with their partner and children. The results show that people in general experienced a lower level of happiness and mental health and higher levels of loneliness compared to normative sample. The lockdown and pandemic condition due to COVID-19 seems to have canceled the gender differences in the perception of happiness and mental health, while it seems to have increased the perception of loneliness experienced by males compared to the pre-pandemic condition. In addition, those who lived alone perceived a greater level of loneliness than those who lived with their partner or partner and children. Unexpectedly, no significant differences emerged regarding the level of happiness and mental health between those who had direct contact with the virus and those who did not. These data should make political decision-makers reflect on the need to pay more attention to the implications that such drastic measures as a lockdown can have on people's psychological well-being.

**Keywords:** COVID-19, happiness, psychological well-being, loneliness, mental health, gender differences, Italy

## INTRODUCTION

On January 30, 2020, the World Health Organization declared the COVID-19 epidemic a public health emergency of international interest (World Health Organization, 2020a), although this information was not disclosed by the media in the various countries but only after the situation manifested itself in Europe with countless deaths. Many people stayed at home and socially isolated

themselves to prevent being infected, both in China and in other countries or because it was imposed by governments or because individuals considered it the only way to protect themselves. The first signs of the COVID-19 in Italy dated to January 31, 2020, but the first outbreak of infections was detected on February 21, 2020, followed by the first deaths. As a result of the first outbreaks, some municipalities were immediately quarantined and subsequently restrictive measures, progressively more stringent, were extended to the entire country, not allowing the population to leave their homes if not strictly necessary and blocking all activities not related to food production. Despite these measures, Italy appears to be the third country in the world for number of positive cases and the second in the world for number of deaths (European Centre for Disease Prevention and Control, 2020). In this scenario, the management of the coronavirus epidemic (COVID-19) by the Italian government, with highly restrictive measures compared to other countries, has made it impossible for the population to continue leading a normal life. Alongside the very strong media attention linked to physical and behavioral restrictions, the government failed to consider the psychological and social aspects that such decisions could have on the population. The government task force also focused on the medical and health aspects as did the international and national scientific literature in the first articles published in the early months of 2020 on the COVID-19 pandemic (COVID Contents n. 1 of 9 April 2020; Istituto Superiore di Sanità [ISS], 2020a, COVID Contents n. 2 of 16 April, 2020, Istituto Superiore di Sanità [ISS], 2020b Study Group COVID-19, Contents n. 1 of 9 April, 2020).

## Mental Health and COVID-19

Mental well-being has been conceptualized in various ways highlighting the multidimensionality of the concept. Diener et al. (1999) depicted subjective well-being as consisting of cognitive (judgment about one's life satisfaction) and affective (balance between positive and negative emotions) aspects. Seligman (2011), on the other hand, introduced a model where psychological well-being encompassed the following domains: positive emotions, engagement, relationships, meaning, and accomplishment. Furthermore, several definitions of mental health have been given over the years: Galderisi et al. (2015) underline how first it was described only as the absence of mental illness and later as a state of well-being that allows the individual to cope with stressful life events, to carry out work in a productive way, and to make a contribution to their own community (World Health Organization, 2004). However, the authors, underlining the possible misunderstandings that could have arisen from this definition, proposed a further one: "Mental health is a dynamic state of internal equilibrium which enables individuals to use their abilities in harmony with universal values of society. Basic cognitive and social skills; ability to recognize, express, and modulate one's own emotions, as well as empathize with others; flexibility and ability to cope with adverse life events and function in social roles; and harmonious relationship between body and mind represent important components of mental health which contribute, to varying degrees, to the state of internal equilibrium" (Galderisi et al., 2015, pp. 231–232). Other

authors argue that mental health is an ambiguous concept (Van Droogenbroeck et al., 2018), one of the basic components in the broader dimension of an individual's general health and therefore difficult to define (Kvrgic et al., 2013). Mental health, in fact, is part integral to health and well-being and can be influenced by several interacting psycho-social, biological, and demographic factors (such as sex, age, and family environment; World Health Organization, 2001; Kvrgic et al., 2013).

Focusing on mental health is of fundamental importance when entire nations are facing catastrophic events, such as the recent one caused by COVID-19, which can compromise the mental health of citizens. However, it is not the first time that entire nations have faced a catastrophic situation due to an uncontrollable medical condition, with repercussions on the economic, political, social, and individual systems. In fact, think of the 2003 epidemic caused by Severe Acute Respiratory Syndrome (SARS) or even the most recent swine flu of 2009. In these cases, the literature had mainly focused on the psychological implications suffered by the patients directly involved and by the medical and healthcare personnel working on the front line: the emotional reactions experienced by those who during the SARS epidemic worked closely with the disease were extremely intense and included fear of contagion, feelings of stigma, loneliness, boredom, anger, anxiety, stress, and a sense of uncertainty (Maunder et al., 2003; Al-Rabiaah et al., 2020). Chua et al. (2004) also found that during the 2003 outbreak, stress levels were high in both patients and healthy participants, indicating that the whole community had been affected regardless of the educational level. Patients also reported feelings of loneliness and boredom caused by prolonged quarantine (Chua et al., 2004) and a high prevalence of psychological distress (Hawryluck et al., 2004).

In relation to the COVID-19 pandemic, most of the research initially focused mainly on the medical aspects, in particular on identifying the epidemiology and clinical characteristics of infected patients (Chen, 2020), on the genomic characterization of the virus (Lu, 2020), on comorbidity with other diseases such as cardiovascular and diabetes mellitus (Kuno et al., 2020), and on the global health challenges (Rubin and Wessely, 2020). Other areas of investigation have focused on the pathology's symptoms associated with acute respiratory distress syndrome (Xu et al., 2020) or the symptoms of posttraumatic stress disorder in patients with stable COVID-19, highlighting how many of these patients suffer from significant PTSD symptoms at the time of discharge with possible negative consequences on their quality of life and work performance.

These data highlight the need for appropriate psychological interventions especially for stabilized COVID-19 patients (Duan and Zhu, 2020). In this regard, online mental health services have been organized in the Chinese context to intercept the psychological needs of the population, who had COVID-19 but also in general, in order to improve the quality and effectiveness of the emergency interventions (Liu S. et al., 2020).

Furthermore, particular attention should be paid to the psychological problems of those who work not only in the front line in the COVID-19 emergency, for example, medical personnel and nurses but also to the population in general, given that vicar traumatization scores of the general population were found to

be significantly higher than those of nurses on the front line (Li et al., 2020).

During the COVID-19 pandemic, the attention was also focused on the psychological repercussions that this situation could cause in healthcare workers especially in stress management (Greenberg et al., 2020; Joob and Wiwanitkit, 2020) caused by the work overload, frustration, and being faced with very difficult choices on a daily basis. It is therefore essential to take into consideration the psychological health of healthcare professionals to prevent the onset of possible issues not only during the critical stages of the epidemic but also in the following ones, to prevent long-term consequences. The mental health of health workers is indeed essential to better controlling infectious diseases and better responding to future unexpected infectious diseases (Chen et al., 2020). As highlighted by Zowalaty and Järhult (2020), the success in containing the COVID-19 pandemic will depend on the ability of the various countries to adopt public health measures capable of identifying clinical cases, to implement a rigorous control of infections in healthcare facilities, to isolate patients, and to be able to contain the spread of the virus in the community and in public education contexts.

Still few research studies have examined the psychological impact of COVID-19 on the general population within the first weeks of the COVID-19 outbreak and related lockdown. The first data have shown symptoms of anxiety, sleep disorders, depression, lower mental well-being, and psychological distress in the general population and the importance of monitoring these dimensions (Ahmed et al., 2020; Brooks et al., 2020; Casagrande et al., 2020; Ko et al., 2020; Moccia et al., 2020; Tian et al., 2020; Wang C. et al., 2020; Wang Y. et al., 2020; Yang and Ma, 2020). Ahmed et al. (2020) also highlighted how the confinement in their homes, due to the COVID-19 epidemic, led to higher levels of anxiety, depression, and a lower level of mental well-being. In Italy, attention has been focused in particular on specific groups such as university students (Capone et al., 2020) and families (Centro di Ateneo Studi e Ricerche sulla Famiglia, Università Cattolica del Sacro Cuore, 2020; Ferrario and Profeta, 2020; Lagomarsino et al., 2020; Libellula Foundation, 2020), and in a few cases on the general population (Ferrucci et al., 2020; Pakenham et al., 2020).

## Emotions and Mental Health

Emotions are fundamental components of the life of human beings from which people draw the stimuli that activate their daily activities. However, even if every emotion is important, the search for positive sensations such as happiness affords an emotional state of well-being and a general realization. The research on happiness conducted in recent years (Luhmann et al., 2012) follows two approaches: studies on eudaimonic well-being, which focuses on psychological well-being, and those on hedonic well-being, which focus on subjective well-being (Ryff and Keyes, 1995). According to Diener et al. (1999), happiness can be considered a dimension of the complex and multidimensional concept of psychological well-being. Among the different notions of happiness presented in the literature, Lyubomirsky et al. (2005) define it as the shortest way to refer to the experiences of frequent

positive emotions. Their review also shows how happiness is positively correlated with health indicators, both mental and physical; this could be due to the fact that it has effects on social relationships, on coping skills (Lyubomirsky et al., 2005; Piqueras et al., 2011), and on stress (Lyubomirsky et al., 2005; Heizomi et al., 2015). Furthermore, happiness and depression are considered two dimensions of the complex and multidimensional concept of well-being (Diener et al., 1999).

Considering emotional well-being during quarantine can be important for understanding the impact that this situation has on the general well-being of people. The ongoing COVID-19 epidemic is generating negative emotions like fear as already argued by Khalid et al. (2016), above all with regard to the emotions of healthcare workers during a Middle East Respiratory Syndrome-Coronavirus outbreak, but also recently underlined by Horton (2020), who proposed “A desperate plea from an ordinary citizen in China.” Furthermore, both studies on previous and current pandemics have highlighted how the epidemic situation has a negative impact on the dimension of happiness (Yip et al., 2010; Yang and Ma, 2020). As pointed out by Wang C. et al. (2020), previous research has revealed multiple psychosocial impacts both on an individual level such as fear of getting sick or dying (Hall and Chapman, 2008) or the negative emotions experienced by individuals following the closure of schools and businesses (Van Bortel, 2016), but also the psychological impacts on the uninfected population, revealing significant psychiatric morbidity (Sim et al., 2010). Furthermore, Cipolletta and Ortu (2020) underline how COVID-19 emergency suspended time, causing uncertainty and anxiety, both for the future and for the coronavirus (“coronaphobia”; Asmundson and Taylor, 2020), which can be reduced making meaning to the events. Moreover, Yang and Ma (2020) found how the outbreak of the epidemic influenced people’s emotional well-being, identifying some factors that can further affect it, such as the probability of contracting a disease and developing relationship problems, while the perception of greater knowledge of the epidemic increases the sense of control, thus becoming a protective factor for emotional well-being.

## Loneliness and Mental Health

Among the relevant risk factors of depression, there is the dimension of loneliness; therefore, happiness and loneliness can be considered two components of individual subjective well-being capable of defining depressive risk conditions (Cacioppo et al., 2006) as well as mental health. In the literature, several authors have been interested in the concept of loneliness, and Henriksen et al. (2019) considered loneliness a very common condition in Western communities. In the past, it has been defined as a complex set of feelings that include reactions to the absence of intimate and social needs (Ernst and Cacioppo, 1999), a problem for society (Cacioppo and Cacioppo, 2018) as well as for the individual, which may have serious health consequences (Luanaigh and Lawlor, 2008; Henriksen et al., 2019). Hyland et al. (2019) argue that loneliness has traditionally been presented as a one-dimensional concept, when in reality it is a multidimensional construct (Cacioppo et al., 2015; Hyland et al., 2019). In particular, some authors (Hawkey et al., 2005, 2012;



Cacioppo et al., 2015) present loneliness as a construct that includes three connected dimensions: intimate loneliness, relational loneliness, and collective loneliness. Hyland et al. (2019), instead, present loneliness as a construct defined by four quantitatively and qualitatively differentiated classes: low, social, emotional, and “social and emotional.” Their study also revealed that the perceived quality, rather than quantity, of interpersonal connections was associated with poor mental health. In fact, as pointed out by Cacioppo and Patrick (2008) and Cacioppo et al. (2015), the construct of loneliness clearly highlights how the human species needs significant others, people to trust, and with whom to plan life. Finally, some authors have found that loneliness is a risk factor for the development of depressive symptoms and is negatively associated with life satisfaction and positive affect (Cacioppo et al., 2010; Chang et al., 2020). It follows that exploring these constructs, still little investigated in the literature on pandemics, is very important. Some authors have found (Porcelli, 2020; Tull et al., 2020) that compulsion at home during the COVID-19 lockdown was associated with greater stress, social isolation, loneliness, and anxiety about their health and the economic aspects.

## Gender Differences During the COVID-19 Pandemic

In relation to mental health, the literature confirms sharp differences between the genders. It is a constant in the literature that women reported worse mental health outcomes (Kvrgic et al., 2013; Giorgi et al., 2014; Van Droogenbroeck et al., 2018). Even during the period of the COVID-19 pandemic, the first data collected by the researchers highlight this trend (Casagrande et al., 2020; Wang C. et al., 2020; Wang Y. et al., 2020).

Furthermore, from the first studies on the psychological effects due to COVID-19, it was found that women were more affected by this situation, manifesting more negative alterations in cognition or mood and hyperarousal than males (Liu N. et al., 2020).

Moreover, also with regard to loneliness, there are gender differences in the literature. Some studies show a higher prevalence of loneliness among women (Pinquart and Sorensen, 2003; Henriksen et al., 2019). Hyland et al. (2019) emphasize that males, mirroring women, show higher social loneliness and less emotional loneliness. In fact, women tended to fall more into the emotional loneliness class, while no differences emerged in relation to “social loneliness.”

Research has shown that, in particular, during the COVID-19 epidemic, women were most exposed to stress and depressive symptoms (Casagrande et al., 2020; Wang C. et al., 2020; Wang Y. et al., 2020), while, in some cases, being men has been associated with to be a protective factor against the risk of mild psychological distress in response to stressful events (Moccia et al., 2020). Even a month after the first cases, it was found that women showed symptoms of posttraumatic stress disorder, to a greater extent than men, in terms of the negative alternation of mood and cognition and hyperarousal (Liu N. et al., 2020). Unlike other studies, Ahmed et al. (2020), despite having identified higher

levels of anxiety and depression and a lower level of mental well-being in the population, did not, however, find gender-related differences.

Therefore, in the light of this situation, a timely understanding of mental health status, an aspect surprisingly overlooked, is urgently needed for society. As can be seen from the analysis of the current literature, little is known about the psychological impact, mental health and well-being of the general population, and the related gender differences at the peak of the COVID-19 epidemic worldwide, while this is one of the first Italian studies to have focused on the population in general to understand the effects of the lockdown.

## AIMS OF THE CURRENT STUDY

Considering this theoretical and contextual framework, the present study aims to investigate psychological well-being in relation to some social dimensions during the initial quarantine period that the Italian population had to cope with. In particular, the research objective is to analyze the perception of happiness, mental health, and the sense of loneliness experienced by the adult Italian population during this period. Specifically, the variables will be examined in relation to gender differences, living alone, living with partner, living with partner and children, or having family members or friends who had COVID-19. Furthermore, we want to investigate the relationships between the variables considered and the dimensions that affect well-being and loneliness.

## MATERIALS AND METHODS

This study is part of a larger multidisciplinary, anonymous online survey; only some specific variables concerning the psychological field and related to the proposed objectives will be presented here. The research design is longitudinal, and in this paper, present data relating to first lockdown in Italy started on March 11th, 2020, with Dpcm #IoRestoaCasa (#IStayatHome). The survey was carried out over a 10-day period, after the first 2 weeks of lockdown, from March 25th to April 4th, 2020. This situation forced most of the population not to work or to engage in smart working and students not to attend face-to-face lessons and to follow lessons via distance learning. The methodology used is quantitative, and the protocol is based on previous studies on the psychological impacts of SARS and influenza outbreaks (Rubin et al., 2010; Park et al., 2018; Al-Rabiaah et al., 2020), as well as on the few studies that had already been published in the psychological field relating to the COVID-19 pandemic in early March 2020 (Liu S. et al., 2020; Rajkumar, 2020; Wang C. et al., 2020). Furthermore, general health, as seen from the analysis of the literature, is a composite construct and, as several authors point out happiness and loneliness are two components of individual subjective well-being. Therefore, taking into account these considerations, in order to measure psychological well-being, a protocol was prepared that included the following scales widely used in the literature and specific questions related to the COVID-19 outbreak.

## Measures

- **Subjective Happiness Scale (SHS)** measures the subjective global happiness, developed by Lyubomirsky and Lepper (1999), and in this study, we used the Italian version by Iani et al. (2013). The scale is made up of four items (e.g., “Some people are generally not happy. They enjoy life regardless of what happens and take the best of everything. How much does this phrase describe it?”) with a Likert response scale, from 1 = *not at all* to 7 = *very much*. The total score ranges from 4 to 28 points; higher scores indicate higher levels of happiness. The scale showed a good internal consistency ( $\alpha = 0.58$ ).
- **General Health Questionnaire (GHQ-12;** Goldberg and Williams, 1988; Italian version Piccinelli and Politi, 1993) consists of 12 items that assess the severity of a mental problem over the past few weeks. Participants have to report whether they have experienced a particular symptom of mental distress on a four-point Likert-type scale from 0 = *less than usual* to 3 = *much more than usual*. The six positive items were corrected from 0 (much more than usual) to 3 (less than usual) and the six negative ones from 3 (much more than usual) to 0 (less than usual). The total score ranges from 0 to 36 points; higher scores indicate worse health. The scale showed a good internal consistency ( $\alpha = 0.83$ ). GHQ-12 is widely used for mental health trend analysis for its ease of use, breadth of distribution, and capacity to reproduce “remarkably robust” results contrasted with longer initial versions (Griffith and Jones, 2019).
- **Loneliness Scale:** we used the Three-Item Loneliness Scale developed by Hughes et al. (2004) from the revised UCLA Loneliness Scale (Russell et al., 1980), Italian version of the revised UCLA Loneliness Scale (Solano and Coda, 1994). It is a short scale for measuring loneliness in large surveys, and it assesses feelings of isolation, disconnectedness, and not belonging. Respondents are placed on a three-point Likert scale from 1 = *hardly ever* to 3 = *often*, with a total score ranging from 3 to 9 points; higher scores indicate greater loneliness. The three-item scale showed a good internal consistency ( $\alpha = 0.60$ ).
- Compilation of a socio-demographic datasheet which included age, gender, education, type of work during the COVID-19 health emergency, size of the home, income, with whom the subject lives during the COVID-19 health emergency, and having family members or friends who had COVID-19.

## Procedure

The online study was promoted through email, WhatsApp, discussion forums, and social networks such as Facebook. The call to the study, with indications of the purpose of the study, the tools proposed, and the type of restitution, included a link to access the questionnaire. Before filling out the questionnaire, subjects had to read the informed consent, declare to agree, to be of age, to have understood that participation was voluntary, and that they could withdraw at any time by closing the browser

window. The convenience sample was recruited through random cascade sampling, starting from some subjects known by the research team. The research, therefore, is characterized by its exploratory nature which does not aim to return a representative image of the Italian population but propose a picture of the perceptions of the population during the lockdown in relation to their psychological well-being. It took an average about of 22 min for each participant to fill out the survey.

The data were collected in compliance with the privacy and research ethics code of the Italian Association of Psychology, after the protocol was approved by the Ethics Committee of the Department of Education Sciences of the University of Genoa.

## Data Analysis

Descriptive statistics were calculated for sociodemographic characteristics and information about variables, and the SHS, GHQ, and UCLA scores were expressed as mean and standard deviation. To investigate the gender differences in relation to SHS, GHQ-12, and UCLA, *t*-tests were used for independent samples. Also, to investigate differences between those who had or did not have family members or friends with COVID-19 in relation to SHS, GHQ-12, and UCLA, *t*-tests were used for independent samples. To compare the differences between our participants and the Italian normative sample for SHS (Iani et al., 2013), GHQ (Giorgi et al., 2014), and UCLA (Caputo, 2017), *t*-tests were conducted for single samples. The Italian samples to which reference was made to perform *t*-tests were chosen on the basis of the socio-demographic characteristics of the participants (gender, age, and non-clinical sample), who took part in the research carried out prior to the COVID-19 [Iani et al. (2013) for SHS, Giorgi et al. (2014) for GHQ-12, and Caputo (2017) for UCLA]. The characteristics were similar to those possessed by the participants in our research. While ANOVA was used to investigate the differences between groups (I live alone, I live with my partner, and I live with my partner and children or people), with *post hoc* Tukey (for homogeneous variances) between group comparisons in case of a significant overall *F*-value. Appropriate effect size statistics that adjust for differences in group sizes were obtained of Cohen's *d* for *t*-tests and  $\eta^2_p$  for ANOVAs.

To explore the relationship between the SHS, GHQ, and UCLA scales, correlation analyses were performed. We used multiple linear regressions to calculate the univariate associations between sociodemographic characteristics, and SHS, GHQ, and UCLA scales. Statistical analysis was performed using SPSS Statistic 18.0.

## Participants

Overall, the sample comprised 1100 participants, distributed throughout the national territory, from whom 721 subjects who claimed to live alone (17.3%), with partner (39.5%), or with partner and children (43.1%) were extrapolated. The majority of respondents were women (75.5%), with an average age of 49.48 years (SD = 12.71, range 22–81), while men had an average age of 52.32 years (SD = 12.85, range 26–83). In **Table 1**, socio-demographic variables of our sample are reported.

**TABLE 1** | Sociodemographic characteristics of the participants ( $N = 721$ ).

Category variables	%
<i>Gender</i>	
Male	24,5
Female	75,5
<i>Marital status</i>	
Unmarried	15,1
Married/cohabiting	74,3
Separate/divorced	8,2
Widower	2,4
<i>People with the subject lives</i>	
Alone	17,3
With partner	39,5
With partner and children	43,1
<i>Educational qualification</i>	
Junior high school	3,4
Secondary school	34,1
Graduation	42,6
Postgraduate specialization	20,0
<i>Work arrangements during COVID-19</i>	
Unchanged	24,5
Smart-working	57,0
Loss of job/work permit/leave	18,5
<i>Household income</i>	
Up to 15,000 euros	11,9
Between 15,001 and 28,000 euros	30,1
Between 28,001 and 55,000 euros	37,3
Between 55,001 and 75,000 euros	11,6
Over 75,000 euros	9,1
<i>Contact with COVID-19</i>	
Subjects that have had some contact with COVID-19	62,8
Subjects that have had COVID-19	6,7
Subjects that have had relatives or friends with COVID-19	27,2
Subjects that believe they or that relatives and friends had COVID-19	24,8
Subjects knew people close to them who did not survive COVID-19	19,8

Over half of the sample came into contact with COVID-19 (62.8%), of whom 6.7% had it directly, 27.2% had relatives and friends, 24.8% believed they had it, or that relatives and friends had it, but they were not sure because no swab tests were done, and 19.8% knew people close to them who did not survive COVID-19.

## RESULTS

The descriptive statistics of each variable used to measure the psychological well-being impact are presented in **Table 2**. It included mean and standard deviation in relation to gender and the categorical variable “people with the subject lives.”

The SHS revealed a mean score above the theoretical average, with average scores practically equal between males and females. The respondents’ mental health levels, measured using the GHQ, revealed mean scores near the theoretical average for both males and females with slightly higher malaise scores for females. For the Loneliness scale (UCLA), participants had a mean score near the theoretical mean score.

Specific analyses on gender differences did not show statistically significant differences for either SHS or GHQ scale, while for UCLA scale, significant gender differences emerged, with women showing significantly higher mean scores ( $M = 5.67$ ;  $DS = 1.97$ ) than the males of the sample ( $M = 5.23$ ;  $DS = 1.70$ ) [ $t(319.9) = -2.73$ ,  $p < 0.05$ , Cohen’s  $d = 0.24$ ]. Furthermore, there were no significant differences in the variables considered between those who had direct contact with the COVID-19 (themselves, relatives, or friends) and those who did not.

Also, as regards living alone, with partner, and with partner and children, in all three scales considered, the scores were always close to the theoretical averages. Furthermore, no significant differences emerged in SHS and GHQ regarding the variable “People with the subject lives”; significant differences emerged instead for UCLA. In fact, there was a significant difference between those living alone and those living with partner or with partner and child in the level of loneliness,  $F(2,681) = 3.83$ ,  $p < 0.05$ , and  $\eta^2_p = 0.011$ . *Post hoc* testing revealed a significant difference between those living with partner ( $M = 5.50$ ,  $SD = 1.87$ ) and who live with partner and children ( $M = 5.43$ ,  $SD = 1.85$ ) having a lower level of loneliness than those living alone ( $M = 5.98$ ,  $SD = 2.11$ ). These finding indicated that there was a higher level of loneliness among those living alone than those living with partner or with partner and children.

Moreover, comparing the SHS data of the participants with those obtained on the Italian validation scale (Iani et al., 2013), the analysis of the means for a single sample showed that our participants presented significantly lower average happiness scores, measured in relation to the COVID-19 emergency (**Table 3**).

**TABLE 2** | Descriptive statistics of variables of the sample ( $N = 721$ ).

Sociodemographic variables	Subjective happiness SHS		Mental health GHQ-12		Loneliness UCLA				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t(df)/F</i>	<i>p</i>	Cohen’s <i>d</i> / $\eta^2_p$
<i>Gender</i>							-2.73 (672)	0.007	0.24
Male	4.51	0.85	17.51	5.63	5.23	1.70			
Female	4.44	0.92	18.23	6.13	5.67	1.97			
<i>People with the subject lives</i>							3.83	0.022	0.011
Alone	4.42	0.85	17.29	6.24	5.98	2.19			
With partner	4.45	0.98	18.20	5.64	5.50	1.87			
With partner and children	4.47	0.91	18.12	6.21	5.43	1.85			

**TABLE 3 |** Subjective Happiness Scale (SHS) comparison between the average values of the participants and the average values of the Italian normative sample.

	SHS				
	Participants	Italian normative sample	t (df)	p	Cohen's d
	M (SD)	M (SD)			
Male	4.51 (0.85)	4.74 (1.22)	-3,414 (166)	0.001	0.22
Female	4.44 (0.92)	4.80 (1.21)	-8,791 (500)	0.000	0.33

As regards the GHQ scale, respondents scored significantly higher than the Italian normative sample (Giorgi et al., 2014) indicating a “worse degree” of mental well-being (Table 4).

The scores on the UCLA scale (Table 5), on the other hand, compared with the Italian normative sample (Caputo, 2017) showed significant differences only in males, who obtained higher loneliness scores than the normative sample, while the females, though having slightly higher scores than the males, did not present differences with the normative sample considered.

A next level of analysis was the correlations between the constructs considered in the study. All the constructs considered correlate with each other. There was a moderate positive correlation between GHQ scale and UCLA scale ( $r = 0.32, p = 0.01$ ), while there was a moderate negative correlation between SHS and GHQ scale ( $r = -0.40, p = 0.01$ ) and SHS and UCLA scale ( $r = -0.32, p = 0.01$ ).

Based on the main correlations highlighted, further investigation highlighted the factors affecting mental health, happiness, and loneliness. The stepwise model selection in multiple linear regression analysis, which considered GHQ scale as a dependent variable, is presented in Table 6.

The model had an  $R^2 = 0.20$ , which means that 20% of the variance in the GHQ scale is explained by the model. The  $R^2$  value was statistically significant. SHS seems to be the biggest predictor

**TABLE 4 |** Mental health comparison between the average values of the participants and the average values of the Italian normative sample.

	GHQ-12				
	Participants	Italian normative sample	t (df)	p	Cohen's d
	M (SD)	M (SD)			
Male	17.51 (5.63)	9.8 (4.9)	17,633 (165)	0.000	1.47
Female	18.23 (6.13)	11.1 (5.7)	25,647 (485)	0.000	1.20

**TABLE 5 |** Loneliness Scale: comparison between the average values of the participants and the average values of the Italian normative sample.

	UCLA				
	Participants	Italian normative sample	t (df)	p	Cohen's d
	M (SD)	M (SD)			
Male	5.23 (1.71)	4.94 (1.92)	2.002 (165)	0.047	0.14
Female	5.68 (1.97)	5.58 (2.08)		NS	

( $\beta = -0.31, p < 0.001$ ), while UCLA ( $\beta = 0.21, p < 0.001$ ) and the size of the home ( $\beta = 0.12, p < 0.05$ ) were moderate predictors.

Table 7 presents the stepwise model selection in multiple linear regression analysis, in which SHS was used as a dependent variable.

The model had an  $R^2 = 0.23$ , which means that 23% of the variance in SHS is explained by the model. The  $R^2$  value was statistically significant. The GHQ scale seemed to be the biggest predictor ( $\beta = -0.36, p < 0.001$ ), while UCLA scale ( $\beta = -0.23, p < 0.001$ ) seemed to be moderate predictors.

Table 8 presents the stepwise model selection in multiple linear regression analysis, in which the UCLA scale was used as a dependent variable.

The model had an  $R^2 = 0.16$ , which means that 16% of the variance in the UCLA scale is explained by the model. The  $R^2$  value was statistically significant. SHS seemed to be the biggest predictor ( $\beta = -0.23, p < 0.001$ ), while GHQ scale ( $\beta = 0.23, p < 0.001$ ) with People with the subject lives ( $\beta = -0.13, p < 0.05$ ), and the qualification ( $\beta = -0.11, p < 0.05$ ) were moderate predictors.

## DISCUSSION

Italy has been hit by a sudden traumatic situation linked to the COVID-19 pandemic that has led the population to a forced lockdown. This situation, as shown by the data of the present study, had a significant psychological impact on its inhabitants.

The data underline how this event has canceled gender differences in the perception of happiness (SHS) and mental health (GHQ-12). In these variables, women usually have a significantly lower score than men. The data, however, show that men and women had similar and significantly lower scores than the pre-pandemic condition; as far as subjective happiness

**TABLE 6 |** Regression model: Mental Health (GHQ) as dependent variable.

Variables	B	SE	Beta	t	R <sup>2</sup>
SHS	-2.110	0.354	-0.314	-5.968	0.195
UCLA	0.640	0.162	0.208	3.955	
Home	-1.409	0.607	-0.116	-2.321	

**TABLE 7 |** Regression model: Happiness (SHS) as dependent variable.

Variables	B	SE	Beta	t	R <sup>2</sup>
GHQ	-0.054	0.007	-0.361	-8.317	0.228
UCLA	-0.107	0.021	-0.225	-5.178	

**TABLE 8 |** Regression model: Loneliness (UCLA) as dependent variable.

Variables	B	SE	Beta	t	R <sup>2</sup>
SHS	-0.497	0.121	-0.228	-4.125	0.162
GHQ	0.076	0.018	0.233	4.214	
People with the subject lives	-0.186	0.074	-0.128	-2.513	
Educational	-0.284	0.132	-0.110	-2.160	



is concerned, the emotional well-being (Iani et al., 2013) scores were significantly higher than mental health (Giorgi et al., 2014), highlighting a worsening of the mental psychological component. These data are also confirmed by recent literature which highlights how the epidemic that has hit the whole world has a negative impact on the perception of happiness (Yang and Ma, 2020) and on mental health in general (Ahmed et al., 2020). Unlike what could be expected, however, no significant differences emerged regarding the level of happiness and mental health between those who had direct contact with the virus and those who did not have it, as if the pandemic condition was so pervasive as to make everyone more vulnerable regardless of whether they are personally affected or not. As regards, however, the data relating to the dimension of loneliness showed significantly higher scores for women than for males. Although comparing our data with the normative sample, significant differences emerge only for males who scored significantly higher than the pre-pandemic condition, as if compulsion at home had increased the perception of loneliness more in men than in women. In practice, the perception of loneliness of women that is normally higher than men did not change during the pandemic compared to the pre-pandemic condition. The male gender therefore seems to have worsened this dimension by perceiving more the dimension of loneliness due to forced isolation at home. These data could be interpreted by the fact that men are probably less used to spending time in the house as opposed to women who are more used to living the domestic dimension. This reflection is supported by the literature (Carriero and Todesco, 2016) which highlights how Italian women are more dedicated to caring for the home, even during the pandemic period (Rania et al., 2020), while men are more used to carrying out activities outdoors. Although technologies, like Facebook and other social networks, have certainly contributed to making people feel more connected, contrasting the feelings of loneliness as highlighted by some recent works (Cho, 2015; Knausenberger and Echterhoff, 2018), the data showed that those who lived alone perceived greater loneliness than those who lived with partner or with partner and children. This can be explained by the fact that those who lived alone had a more intense perception of the lack of social contacts, caused by compulsion at home. In fact, as Tull et al. (2020) argue, the reduction of contacts due to the emergency leads to increased feelings of loneliness and social isolation.

The variables considered are all related to each other, highlighting that with the decrease in happiness, due to the situation experienced by people in this period, a worse perception of mental health increases. The GHQ, in fact, evaluates both the perception of anxiety and depression and the well-being and social functioning dimensions that were both put in crisis by the forced lockdown. Furthermore, there are also positive relationships between the perception of loneliness and mental malaise and negative relationships between loneliness and happiness as also found in the literature (Cacioppo et al., 2010; Lee et al., 2019; Chang et al., 2020).

In support of these results, the regression analyses highlighted the dimensions that influence the perception of mental health in the lockdown period. The lower level of happiness and the greater perceived loneliness as well as the size of the home had

effects on the participants' perception of mental health. In fact, Yang and Ma (2020) found that sharing a limited space for long periods of time could have had an impact on a couple's relationship, and therefore on psychological well-being. On the other hand, regarding the construct of loneliness, the predictors are happiness, mental health, the persons with the subject lives, and education. Obviously living alone makes you perceive the condition of loneliness more in a period in which compulsion at home does not allow you to experience external relations. Indeed, Killgore et al. (2020) found that having to stay home because of the pandemic has a negative impact on the perception of loneliness and social disconnection. Porcelli (2020) also found that loneliness combined with anxiety and fear is one of the most dangerous consequences of the condition of social isolation that has been forced on us for a very long period. The variable education also affects the level of loneliness. This figure is in line with the literature which highlights how low levels of education can lead to a significantly higher level of psychological symptoms (Tian et al., 2020).

These data must make researchers, policymakers, and psychologists working in the field reflect on the fact that the data were collected 2 weeks after the lockdown and for the next 10 days, and therefore it is presumable that with the passing of the lockdown, this perception of malaise could also be accentuated.

## IMPLICATIONS FOR PRACTICE

These data should be brought to the attention of political decision-makers: although it is true that the medical health dimension remains a particularly relevant and essential aspect, it nevertheless seems appropriate to also take into account the dimension of psychological well-being of the population, which at this moment appears to be particularly strained. Considering that these data were collected in the first quarantine period, it would be appropriate to collect further data at a later date given the prolonged situation in order to track the trend of the psychological variables severely tested by the lockdown period and by the climate of medical and economic uncertainty being faced.

Therefore, it is important to monitor the progress of these psychological dimensions to intercept any alarm signal for both the population affected by COVID-19 as highlighted in the literature (Bo et al., 2020), both for the general population and to prevent long-term consequences.

We therefore believe that our data could be useful for hypothesizing future and diversified interventions to be applied in situations comparable to the current one: considering the psychological dimension of the subjects from the outset could allow participants to more effectively face mandatory lockdown at home and to feel more involved in political decisions and not to experience them as impositions. This is especially important since it is very likely that there may be a resurgence of this virus as has already happened in the past with similar viruses (Pathan et al., 2020). As highlighted by Yang et al. (2020), the lessons learned during the SARS epidemic and now during the SARS-CoV-2 pandemic may provide elements of reflection and help build a

response capacity for future situations in order to be ready for future epidemics. Moreover, at the moment, there is no scientific evidence that people who have had COVID-19 have developed antibodies and are therefore protected from reinfection (World Health Organization, 2020b). Therefore, a possible resurgence of the virus cannot be excluded, also linked to the failure to reach herd immunity, as sustained in some countries.

This research has some limitations. In fact, it can be easily seen from the sociodemographic data that most of the participants have a high level of education, which is not very representative of the general population even if the questionnaire was distributed through various social networks accessible to all groups of the population. Therefore, another limit can be linked to the online administration of the tool used, which despite the researchers' efforts could have influenced the involvement of some target populations. However, due to the contextual situation that involved forced physical distancing, the online questionnaire method seemed the only possible strategy to reach a large number of subjects and has already been used by other researchers in relation to the COVID-19 epidemic (Wang Y. et al., 2020). Finally, another limit is represented by the gender of the participants; in fact, although the data emerged regarding the gender difference are interesting, it should be emphasized that 75.5% of the participants are female.

Nonetheless, the data have revealed interesting aspects to consider in order to face with greater awareness critical situations and forced quarantine due to new waves of COVID-19 or future viruses (Yang et al., 2020). Despite the weaknesses highlighted, the study's strengths include the fact that it is one of the first carried out on the lockdown period linked to the COVID-19 pandemic in Italy that aims to investigate the psychological dimensions of individual well-being.

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- Although the quarantine measures adopted in several countries have reduced deaths, the impacts of the COVID-19 pandemic are not limited only to the medical aspects, but its sociological, psychological, and economic effects at a global level will have repercussions not only in the immediate short term but also in the following months. Therefore, the longitudinal approach of our study is undoubtedly a strength that will allow us to monitor the well-being and mental health aspects of the general Italian population.
- ## DATA AVAILABILITY STATEMENT
- The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.
- ## ETHICS STATEMENT
- The studies involving human participants were reviewed and approved by the Ethics Committee of the Department of Education Sciences of the University of Genoa. The participants provided their written informed consent to participate in this study.
- ## AUTHOR CONTRIBUTIONS
- NR conceived of the presented idea and supervised the findings of this work. NR and IC developed the theory, performed the quantitative analyses, and wrote the manuscript. Both authors discussed the results and contributed to the final manuscript.
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# Symptoms of Anxiety and Depression in Students With Developmental Disabilities During COVID-19 Lockdown in Poland

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**Background:** In this study we aimed to assess symptoms of anxiety and depression in persons with developmental disabilities during COVID-19 lockdown.

**Method:** Soon after school closures related to the pandemic, we conducted telephone interviews with 64 vocational school students with developmental disabilities, the majority of whom had mild intellectual disability, and their parents. The parents were asked about stressful events experienced during lockdown. The students were assessed with screening measures for anxiety (GAD-7) and depression (PHQ-8).

**Results:** Over one third of the tested students reported mild or more severe symptoms of anxiety and depression, and girls were more affected than boys. The number of experienced lockdown inconveniences predicted the severity of depression symptoms in girls.

**Discussion:** The high prevalence of symptoms of anxiety and depression in persons with developmental disabilities indicates the need for screening studies and the provision of psychological help in situations such as the COVID-19 lockdown.

**Keywords:** COVID-19, developmental disabilities, intellectual disability, anxiety, depression, lockdown

## INTRODUCTION

Since the new coronavirus disease (COVID-19) was first identified in Wuhan, China, in December 2019 (1) it has rapidly spread to other regions of China and other countries, thus becoming a major concern for global public health (2). The first cases of COVID-19 in Europe were reported in February in Italy, and this country is one of the most seriously affected by the disease in the region (3). The first case of COVID-19 in Poland was identified at the beginning of March 2020 (4), a week before the WHO's director-general declared a state of pandemic (5). The precautions officially introduced in March by the Polish government included closures of schools and universities, closures and limitations in trade and services, and significant movement restrictions for citizens (6). After the 1st of April, persons under the age of 18 could leave home only in the presence of a parent or caregiver. The restrictions also concerned persons with developmental disabilities and their families. However, in the context of the problems that affected everyone in the country, little attention seemed to be paid to the situation of this particular group.

The study presented in this article aimed to investigate the symptoms of anxiety and depression in vocational school students with developmental disabilities who stayed home during the pandemic situation due to school closures. The studied group consisted of persons with developmental disabilities, the majority of whom had intellectual disabilities; this is a vulnerable group whose risk of psychopathology is ~4–5 times higher than in the general population (7), and three to four times higher for persons with intellectual disability (8). The higher prevalence of mental health issues also applies to symptoms of anxiety and depression (9). The sex differences in general population indicate that women are at significantly greater risk of anxiety and depression than men (10). Findings related to persons with ID also suggest a higher prevalence of depression in girls (11), and that girls with ID are significantly more fearful and experience more worry than boys (12). We assumed that the burden related to the pandemic situation may exacerbate emotional difficulties in this group. Similar assumptions in regard to general population were made and confirmed in a study conducted in Ireland during the pandemic (13). The study allowed us to obtain information about these difficulties and to identify persons with developmental disabilities in need of psychological or psychiatric help.

## METHOD

### Ethical Considerations

The study was approved by the ethical committee at the Pedagogical University of Krakow and by the school board of the special education center in which it was conducted. During school enrolment, the parents or primary caregivers of all the participants in the survey gave their written consent to receive an invitation to participate in scientific research. Detailed information about this study was given during telephone conversations and consent was obtained orally from the participants. The participants were informed that they could withdraw from the study at any time. The data was kept and used in accordance with the General Data Protection and Regulation Law in force (14).

### Participants

We assessed 64 students (30 boys) from a vocational school for persons with developmental disabilities ( $M_{age} = 18.5$  years;  $SD = 2.25$ ) along with their parents or primary caregivers. Included in our study were 62 students with a diagnosis of mild intellectual disability, seven persons with a diagnosis of intellectual disability comorbid with a physical disability, and one with visual impairment. Two students had a diagnosis of an autism spectrum disorder. In each case, the diagnoses were provided by a psychological-pedagogical counseling center. The mild intellectual disability was diagnosed based on the ICD-10 (15) criteria. The results of a priori analysis of statistical power for two independent Pearson's coefficients with effect size defined as  $q = 0.75$  showed that for error probability set as  $\alpha = 0,05$  and power set as  $1-\beta = 0.8$  the minimum required sample size was 62, when equal sizes of both subgroups were assumed.

## Measures

### Interview Regarding the Lockdown Situation

The interview comprised seven questions that required a “yes” or “no” answer about difficulties that persons experienced during the last 2 weeks of COVID-19 lockdown. The parents or primary caregivers were asked how often they had sought information regarding the outbreak, whether they had experienced trouble accessing the internet or buying basic food products, hygiene products, or regularly used medications, as well as if they had any difficulties in dealing with official matters. The participants were also asked if anyone at home during the last 2 weeks had lost employment or the opportunity to do their job, and if anyone had felt ill or experienced a substantial worsening of their medical condition.

### Generalized Anxiety Disorder 7

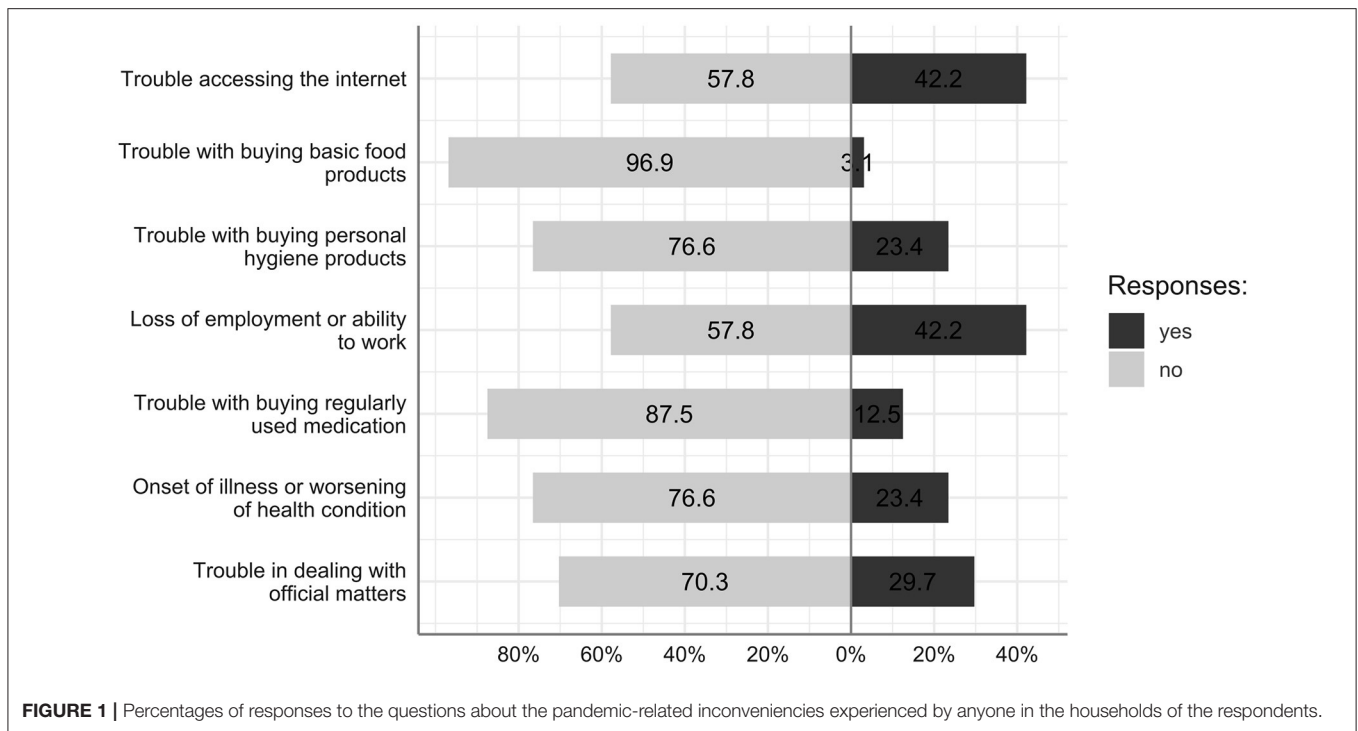
Generalized Anxiety Disorder 7 (GAD-7) is a brief questionnaire developed for screening purposes by Spitzer et al. (16). This tool is intended to measure the severity of symptoms of anxiety. We used a Polish translation of the questionnaire available on the Patient Health Questionnaire website (17). This measure has been linguistically validated by the MAPI Research Institute (18) in accordance with the international standards of cultural adaptation methodology described in the Linguistic Validation Manual for Health Outcome Assessments (19) and ISPOR guidelines for the cross-cultural adaptation (20).

### Patient Health Questionnaire – 8

Patient Health Questionnaire – 8 (PHQ-8) is a brief questionnaire based on the widely used PHQ-9 screening measure for depressive symptoms (21). The only difference between PHQ-8 and PHQ-9 is that the former questionnaire does not include the last question regarding suicidal ideation. The PHQ-8 has been suggested as a better measure than PHQ-9 since the item regarding suicidal ideation is considered inaccurate (22). Also, the PHQ-8 is suggested as a screening measure when a study is conducted *via* telephone due to ethical reasons (23). The items in the Polish version of the questionnaire have been linguistically validated (18) and were obtained from the official site (17).

## Procedure

The study was conducted in Krakow in March and April 2020, after school closures due to the pandemic outbreak. We obtained the approval to conduct this research from the school board of a special education center for adolescents and young adults with intellectual disabilities. The data was gathered by two school psychologists who contacted the students and their parents or primary caregivers by phone. Before the pandemic, the psychologists were familiar with all the students they contacted. After giving consent, the parent or primary caregiver answered the questions regarding inconveniences experienced during lockdown, and the students answered questions included in GAD-7 and PHQ-8. When the participants reported that they had experienced symptoms of anxiety or depression, the psychologists conducting the



**TABLE 1 |** Descriptive statistics for age, GAD-7, PHQ-8, and sum of reported inconveniences.

Variable	Gender	Mean	Median	Std. Deviation	Minimum	Maximum
Age	Boys	18.60	18.5	2.39	16	23
	Girls	18.38	18.0	2.16	15	23
GAD-7 raw scores [sum of points]	Boys	2.33	1	3.51	0	14
	Girls	5.15	3	5.25	0	19
PHQ-8 raw scores [sum of points]	Boys	1.80	0	3.76	0	18
	Girls	3.91	2	4.75	0	16
Sum of reported inconveniences	Boys	2.17	2	1.62	0	5
	Girls	2.15	2	1.91	0	7

interview offered them counseling and help in setting up a psychiatric consultation.

## Statistical Analyses

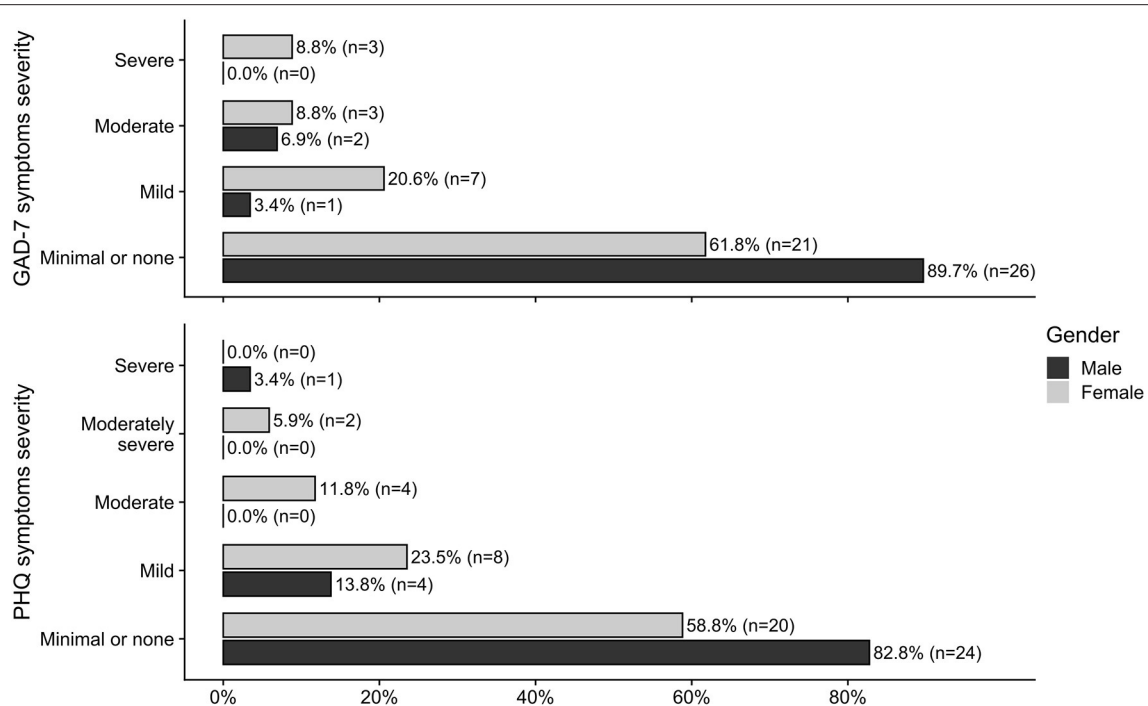
Due to the skewness of the distributions of the total scores in GAD-7 and PHQ-8, the Mann-Whitney  $U$ -test was used to examine the gender differences in the total scores in both scales with the rank-biserial correlation as a measure of the effect size. The moderated regression analyses based on the ordinary least squares linear model were performed to verify whether the impact of the pandemic-related inconveniences on the total GAD-7 and PHQ-8 scores differed between girls and boys. The sum of these inconveniences, gender, and their interaction were specified as the predictors in the regression models. The dependent variables were transformed by taking the square root of their initial value to avoid the skewness of the distribution of the residuals in the regression models.

The non-parametric tests and regression analyses were computed using the free and open-source statistical platform jamovi (24), based on the R programming language for statistical computing (25) with the GAMLj jamovi module (26). The plots were prepared using the sjPlot R package (27).

## RESULTS

The frequencies for the pandemic-related inconveniences experienced by anyone in the subjects' households are presented in **Figure 1** and additional descriptive statistics are presented in **Table 1**. Trouble accessing the internet (42.2%), loss of employment or ability to work (42.2%), and trouble in dealing with official matters (29.2%) were the inconveniences most frequently reported by the respondents.

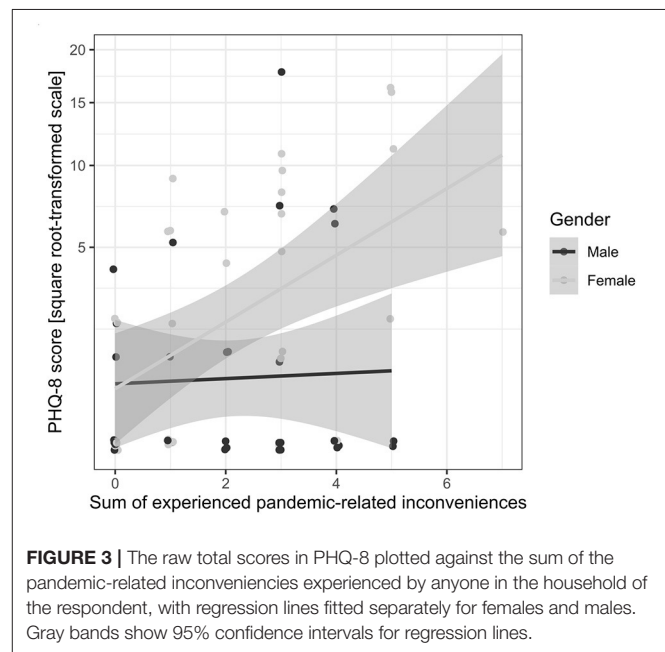
The results of the Mann-Whitney  $U$  test showed that the total scores in GAD-7 were higher in girls than in boys,  $U = 345$ ,  $p = 0.024$ ,  $r_{rb} = 0.324$ , with 95% confidence intervals from 0.050



**FIGURE 2** | Counts and within-group percentages for females and males classified in diagnostic categories of degrees of the severity of symptoms measured by GAD-7 and PHQ-8.

to 0.552. Girls also obtained higher total scores in PHQ-8 than boys,  $U = 359$ ,  $p = 0.031$ ,  $r_{rb} = 0.296$  with 95% confidence intervals from 0.020 to 0.531. The raw total scores in GAD-7 and PHQ-8 were re-coded according to the criteria specified in the diagnostic manual (17) into categories representing degrees of symptom severity. The sample distribution for each of the categories is depicted in **Figure 2** for boys and girls separately.

The overall model  $F$  test for the multiple regression conducted to predict the square root-transformed GAD-7 total scores from gender, sum of the experienced pandemic-related inconveniencies and their interaction was insignificant,  $F_{(3,60)} = 2.48$ ,  $p = 0.070$ ,  $R^2 = 0.110$ ,  $R^2_{adj} = 0.066$ . The overall model  $F$  test for the linear model that predicts the square root transformed PHQ-8 total scores from gender, sum of the experienced pandemic-related inconveniencies and the interaction of both was significant,  $F_{(3,60)} = 6.09$ ,  $p = 0.001$ ,  $R^2 = 0.223$ ,  $R^2_{adj} = 0.195$ . The results of the omnibus tests revealed that the interaction of gender with the sum of the experienced pandemic-related inconveniencies was the only significant effect,  $F_{(1,60)} = 4.16$ ,  $p = 0.046$ ,  $R^2 = 0.109$ ,  $\eta_p^2 = 0.065$ . This indicates that gender moderates the impact on the total PHQ-8 scores of experienced inconveniencies. As can be inferred from the regression lines and confidence intervals bands shown in **Figure 3**, in boys the level of predicted total PHQ scores are similar for varying values of the sum of experienced inconveniencies,  $b = 0.029$ , with  $CI_{95\%}$  from  $-0.238$  to  $0.297$ ,  $t_{(28)} = 0.220$ ,  $p = 0.826$ , whereas in girls as the sum of the experienced inconveniencies increases, the predicted total PHQ scores gradually increase,  $b = 0.378$ , with  $CI_{95\%}$  from  $0.165$  to  $0.590$ ,  $t_{(32)} = 3.55$ ,  $p < 0.001$ .



## DISCUSSION

In our study, we aimed to investigate the symptoms of anxiety and depression during the COVID-19 lockdown in students with developmental disabilities, the majority of whom have been diagnosed with mild intellectual disability. We



also interviewed the students' parents or caregivers about the difficulties experienced by the members of their household in the last two weeks. The most-often reported difficulties included trouble with accessing the internet and a household member's loss of employment or opportunity to work. However, it is also worth noting that almost one-fourth of participants' household members reported they experienced the onset of an illness or worsening of their health condition. These results indicate the strong negative influence of COVID-19 lockdown on the health of family members and the financial situation of households of persons with developmental disabilities.

The severity of symptoms of anxiety and depression was higher in girls than in boys with developmental disabilities, which is consistent with results from previous studies (11). Over one-third of girls experienced mild or stronger symptoms of anxiety and depression, whereas <15% of boys experienced symptoms of anxiety, and 20% experienced symptoms of depression. We did not find significant differences between girls and boys in terms of the impact of the sum of experienced inconveniences on anxiety. However, the effect of interaction between gender and inconveniences was close to statistical significance ( $p = 0.070$ ). This indicates that lockdown-related anxiety should be investigated further in larger samples. In our study, we also found that the number of lockdown-related inconveniences associated with depression symptoms affected participants differently depending on their gender. In girls, the number of difficulties related to lockdown considerably impacted their symptoms of depression. This result may indicate that girls with developmental disabilities are particularly vulnerable when it comes to coping with difficulties that arise in unexpected and burdensome situations, such as the COVID-19 lockdown. The sex differences in levels of anxiety and depression occur typically in general population (10), and also in persons with intellectual disability (9). The possible explanations why the boys presented less symptoms in our study may concern social expectations regarding the male role in society, which may lead to underreporting of emotional problems (12), or variety of biological factors (10). In our study a small number of boys seemed to show increase in emotional symptoms as a function of pandemic-related inconveniences. In future studies differences between boys who do and boys who do not develop emotional symptoms should also be an object of an in-depth analysis.

The study has some limitations. First, the sample of the students is relatively small, and further studies should be conducted on larger samples of persons with developmental disabilities. Second, the baseline level of depression and anxiety symptoms before the pandemic occurred was not assessed in our study, thus, there is a possibility that there are other factors,

except the pandemic-related difficulties, which influence the results. Third, the exact IQ scores for all the participants could not be obtained due to the pandemic situation. In future similar studies IQ scores should be included in regression analyses. Finally, we tested the participants only once, soon after the lockdown began. In future studies it seems important to assess emotional symptoms several times since it is possible that symptoms of depression and anxiety may relate to the amount of time spent in lockdown and may change in respect of further experienced inconveniences.

The results of our study indicate that symptoms of anxiety and depression occur frequently in persons with developmental disabilities (especially in girls). These results stand in accordance with the results of studies conducted in Ireland during the pandemic in which women also presented higher rates of anxiety and depression (13). Although in our study we were not able to verify whether the severity of the symptoms has changed compared to the period before the lockdown, the increase in the symptoms of anxiety and depression in persons with developmental disabilities should be expected in situations of school closures, limitations in trade, services, and mobility, and other troublesome restrictions. Therefore, we recommend conducting screening assessments for symptoms of anxiety and depression that are carried out similarly to those described in this paper; we also recommend the provision of psychological and psychiatric support to persons with intellectual disability and other vulnerable groups.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee at the Institute of Psychology, Pedagogical University of Kraków. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## AUTHOR CONTRIBUTIONS

MG and LK contributed to the concept, design of the study, and wrote the manuscript. MG organized and conducted the research. LK performed the statistical analysis and prepared the figures. All authors contributed to the revision of the manuscript and read and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Mental Health Status of the General Public, Frontline, and Non-frontline Healthcare Providers in the Early Stage of COVID-19

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**Background:** The outbreak of COVID-19 occurred in 2020 which resulted in high levels of psychological stress in both the general public and healthcare providers.

**Purpose:** The study aimed to address the mental health status of people in China in the early stage of the COVID-19 outbreak, and to identify differences among the general public, frontline, and non-frontline healthcare providers.

**Method:** A cross-sectional study was used to identify the mental health status of the general public and healthcare providers between Jan 29 and Feb 11, 2020. Data were collected using an online survey from a convenience sample. The instruments used included: Patient Health Questionnaire, Generalized Anxiety Disorder scale, Insomnia Severity Index, and Impact of Event Scale-Revised. Descriptive statistics were used to describe the data. Kruskal-Wallis H tests were performed to assess differences in measurements among the three groups;  $P < 0.05$  (two-sided) was considered to be statistically significant.

**Results:** Results showed that a majority of participants experienced post-traumatic stress (68.8%), depression (46.1%), anxiety (39.8%), and insomnia (31.4%). Significant changes in the mental health status of frontline providers was found as compared to those of the other groups ( $P < 0.001$ ). Interestingly, the scores of the general public were significantly higher than those of the non-frontline healthcare providers ( $P < 0.001$ ).

**Conclusion:** These findings provide information to evaluate outbreak associated psychological stress for the general public and healthcare providers, and assist in providing professional support and actionable guidance to ease psychological stress and improve mental health.

**Keywords:** COVID-19, healthcare providers, general public, mental health distress, depression, anxiety

## INTRODUCTION

The outbreak of Coronavirus Disease (COVID-19) occurred in Hubei province in December 2019, resulting in more than 82,165 confirmed cases, and 3,298 deaths in China (1). The pandemic then spread quickly world-wide as countries rolled out measures to curb the effects of the novel coronavirus (2). In the face of this large-scale public health event, both healthcare providers and the public have been experiencing psychological pressure. The surge of confirmed cases and deaths stressed the entire healthcare system, and many healthcare providers were recruited from multiple departments to control the epidemic. About nine million residents of Wuhan (the provincial capital) were under home quarantine for 2 months because of the lock-down policy, and their life was significantly disrupted (3). The development and implementation of mental health assessment, treatment and services are vital goal in the health response to the COVID-19 outbreak (4).

Following the major outbreaks of severe respiratory syndrome (SARS) in 2003 and Middle East respiratory syndrome (MERS) in 2015, a series of mental health disorders of healthcare workers were reported, including depression, anxiety, delirium, post-traumatic stress disorder (PTSD), and even suicidality (5, 6). The risk factors for these mental health disorders included exposure to trauma, such as witnessing and caring for patients who were severely ill, the deaths of healthcare professionals, substantial mortality and bereavement, perceived life threat, orphaning of children, food and resource insecurity, discrimination against affected families, and stigma (7). Although the outbreaks of SARS and MERS stimulated related research, there has been minimal focus on the psychological impact of infectious diseases on persons in the initial stage of the outbreak.

This study aims to understand the changes in the mental health status of the general public and healthcare providers in the early stage of the COVID-19 outbreak. The findings of this study will provide insight into the development of psychological interventions aimed to support people affected by a pandemic.

## METHODS

### Settings and Participants

Due to the strict lockdown and quarantine policy, this national, cross-sectional study was conducted between Jan 20 and February 11, 2020 using an online survey. Ethical approval for this study was received from the institutional review board at Renmin Hospital of Wuhan University (No. WDRY2020-K004). Eligibility criteria of participants included: (1) frontline healthcare providers: a licensed healthcare professional who worked in a hospital designated to care for COVID-19 patients; (2) non-frontline healthcare providers: a licensed health professional who worked in a health care facility that did not directly care for COVID-19 patients; (3) members of the general

public: residents of the community who were >18 years of age. Staff from the COVID-19 designated hospitals were contacted by the research team and asked to invite members of their work group to complete an online survey. This survey was distributed *via* WeChat, a commonly used social media platform in China. Meanwhile, information about the study and the online survey link were posted on WeChat to recruit participants from the general public. In this way, the online survey was open to a large population of healthcare providers and the general public. Respondents were asked to complete an online informed consent, prior to completing the survey. A total of 915 frontline healthcare providers, 1,659 non-frontline healthcare providers and 490 members of the general public were recruited and completed the survey.

### Demographic and Mental Health Questionnaires

Demographic questionnaires collected data on gender, age, marital status, educational background, profession, and professional titles.

#### Depression

Depression was evaluated by the Patient Health Questionnaire (PHQ-9), which has nine items measuring self-assessed depressive symptoms experienced during the previous 2 weeks. It uses a 4-point Likert-type scale (0 = never, 1 = sometimes, 2 = more than once a week, and 3 = almost every day). The total score ranges from zero to 27, and higher scores indicate more depressive symptoms. Scores of 5, 10, and 15 represent cutpoints for mild, moderate, and moderately severe depression, respectively. The PHQ-9 has shown good psychometric properties (8, 9).

#### Anxiety

Anxiety was measured by the Generalized Anxiety Disorder scale (GAD-7), a self-report tool developed by Spitzer et al. (10) that follows the criteria from the Diagnostic and Statistical Manual-IV (DSM-IV). The seven items included continuous variables and verification questions. These items describe the typical symptoms of generalized anxiety disorder (GAD) and are rated on a 4-point scale, from “not at all” to “nearly every day”. The scores on the nine items are summed for total scores that range from zero to 27; a higher score represents higher anxiety severity. Scores of 5, 10, and 15 represent cutpoints for mild, moderate, and moderately severe anxiety, respectively. Psychometric evaluations of the GAD-7 suggest that it is a reliable and valid measure of GAD symptoms in the psychiatric patient (11, 12).

#### Insomnia

The Insomnia Severity Index (ISI) is a brief instrument that assesses insomnia according to the criteria from the DSM-IV and the International Classification of Sleep Disorders (13). The ISI is a 7-item self-report questionnaire assessing the nature, severity, and impact of insomnia in the past month. A 5-point Likert scale (0 = none; 4 = very severe) is used to rate each item, with total scores ranging from zero to 28. A higher total score

**Abbreviations:** PHQ-9, patient health questionnaire, GAD-7, generalized anxiety disorder; ISI, insomnia severity index; ISE-R, impact of event scale-revised.



indicates more severe sleep difficulties. Scores of 8, 15, and 22 represent cutpoints for subthreshold, moderate, and moderately severe insomnia, respectively. Adequate psychometric properties for both the English and Chinese versions have been reported in previous studies (14, 15).

### Post-traumatic Stress

The Impact of Event Scale (IES), a self-report questionnaire, is the most widely used measure of PTSD symptoms in critical care outcomes research (16). The IES-R which is the revised version of the scale measures reexperiencing (intrusion) symptoms, avoidance/numbing symptoms, and hyperarousal symptoms of PTSD (17). With the IES-R, respondents are asked to report how distressed or bothered they have been by particular difficulties in the past seven days: “not at all” (item score 0), “a little bit” (score, 1), “moderately” (score, 2), “quite a bit” (score, 3), or “extremely” (score, 4), with total scores ranging from zero to 88 for the 22 items of the scale. Scores of 9, 26, and 44 represent cutpoints for mild, moderate, and moderately severe PTSD symptoms, respectively. The IES-R has good reliability and validity in both the English and Chinese versions (18–20).

### Statistical Analysis

Descriptive statistics including frequency and percentages were used to describe the demographic characteristics of the participants. Since the data were not fit the normal distribution, Kruskal-Wallis H tests were performed to assess differences in the characteristics and severity of mental health distress between frontline, non-frontline healthcare providers and the general public and  $P < 0.05$  (two-sided) was considered to be statistically significant. Furthermore, Kruskal-Wallis H tests were performed to assess the differences in the total score of the mental health measurements between the three groups of participants. Dunn-Bonferroni *post-hoc* tests were utilized to compare the group differences when the result of the Kruskal-Wallis H tests indicated a statistical significance.

## RESULTS

### Comparison of Demographic Characteristics Between the General Public, Non-frontline, and Frontline Healthcare Providers

A total of 3,064 participants (915 frontline healthcare providers, 1,659 non-frontline healthcare providers, and 490 members of the general public) completed the online survey. Most were female (75.8%) and the majority (76.1%) were <40 years of age. Significant statistical differences were found in gender, age, marital status, and educational background between the general public, non-frontline, and frontline healthcare providers. Additionally, there was a significant difference in professional titles between non-frontline and frontline healthcare providers (see **Table 1**).

### Comparison of Depression, Anxiety, Insomnia, and Impact of Event Scores Between the General Public, Non-frontline, and Frontline Healthcare Providers

In this study, a majority (68.8%) of participants experienced post-traumatic stress and some reported symptoms of depression (46.1%), anxiety (39.8%), and insomnia (31.4%). When comparing participants in the three groups, more frontline healthcare workers had depression (58.8%), anxiety (52.6%), insomnia (42.2%), and post-traumatic stress (76.1%) than participants in the other groups. The results showed significant differences in the occurrence of depression, anxiety, insomnia, and post-traumatic stress in these groups ( $P < 0.001$ ) (see **Table 1**).

Results in **Table 2** show that a statistically significant difference was found among the three groups of participants (general public, non-frontline health professionals, and frontline health professionals) in regard to four aspects of mental health status. The frontline healthcare providers had significantly higher median scores for depression, anxiety, insomnia, and post-traumatic stress than the general public and non-frontline healthcare providers ( $P < 0.001$ ). The general public had significantly higher median scores for depression, anxiety, and insomnia than non-frontline healthcare providers ( $P < 0.001$ ).

## DISCUSSION

Most of the participants were under 40 years of age. This might be due to the fact that the social media platform used to distribute the survey is more often accessed by young adults. The results indicated that the frontline healthcare team is younger (<age 41), and many were single, with junior-level professional titles. This is consistent with the fact that hospitals are the traditional location of employment of recent healthcare graduates. More nurses (69.9%) were in the frontline team in Hubei province and this is consistent with nurses comprising 68% of the frontline team throughout China due to the intensive care needs of patients with COVID-19. Therefore, the sample in this study was representative of the healthcare providers.

The results of this study indicated that during the initial stage of the COVID-19 outbreak, healthcare providers who provided direct care for patients with COVID-19 had significantly higher scores on depression, anxiety, insomnia, and post-traumatic stress. This result was consistent with the findings of previous research during the outbreaks of SARS and MERS, as most of the healthcare providers experienced severe emotional distress (21–23). When the coronavirus appeared, frontline providers were managing this unknown infectious disease and adapting their expertise to stop its rapid spread. They were faced with a myriad of physical and psychological challenges, including intensive work for long hours, an entirely new disease, shortages of equipment and supplies, high risk of occupational exposure, fear of spreading the virus to their families or colleagues, caring for patients who were critically ill, and witnessing the sudden loss of lives (4). All these physical and psychological stressors make frontline healthcare providers particularly vulnerable to mental

**TABLE 1** | Socio-demographic characteristics of participants (general public, frontline, and non-frontline) (*N* = 3,064).

Variables	Number (%)				X <sup>2</sup>	P-value
	Total ( <i>N</i> = 3064)	General public ( <i>n</i> = 490)	Non-frontline ( <i>n</i> = 1659)	Frontline ( <i>n</i> = 915)		
<b>Gender</b>						
Male	741 (24.2)	203 (41.1)	361 (21.8)	177 (19.3)		-
Female	2323 (75.8)	287 (58.6)	1298 (78.2)	738 (80.7)		
<b>Age (in years)</b>						
18~30	1351 (44.1)	189 (38.6)	697 (42.1)	465 (50.8)		-
31~40	980 (32.0)	172 (35.1)	513 (30.9)	295 (32.2)		
>41	733 (23.9)	129 (26.3)	449 (27.1)	155 (16.9)		
<b>Marital status</b>						
Single	1047 (34.2)	171 (34.9)	499 (30.1)	377 (41.2)		-
Married	2017 (65.8)	319 (65.1)	1160 (69.9)	538 (58.8)		
<b>Educational background</b>						
Bachelor's degree and below	2551 (83.3)	425 (86.7)	1361 (82.0)	765 (83.6)		-
Master's degree and above	513 (16.7)	65 (13.3)	298 (18.0)	150 (16.4)		
<b>Profession</b>						
Physician	NA	NA	535 (32.2)	248 (27.1)		-
Nurse			947 (57.1)	640 (69.9)		
Other			177 (10.7)	27 (3.0)		
<b>Professional title</b>						
Junior	NA	NA	910 (54.9)	566 (61.8)		-
Intermediate			457 (27.5)	254 (27.8)		
Senior			292 (17.6)	95 (10.4)		
<b>PHQ-9</b>						
None	1651 (53.9)	264 (53.9)	1010 (60.9)	377 (41.2)	95.021	<0.001
Mild	933 (30.5)	127 (25.9)	458 (27.6)	348 (38.0)		
Moderate	277 (9.0)	52 (10.6)	111 (6.7)	114 (12.5)		
Moderately severe	203 (6.6)	47 (9.6)	80 (4.8)	76 (8.3)		
<b>GAD-7</b>						
None	1843 (60.2)	301 (61.4)	1108 (66.8)	434 (47.4)	95.174	<0.001
Mild	865 (28.2)	125 (25.5)	409 (24.7)	331 (36.2)		
Moderate	218 (7.1)	42 (8.6)	84 (5.1)	92 (10.1)		
Moderately severe	138 (4.5)	22 (4.5)	58 (3.5)	58 (6.3)		
<b>ISI</b>						
None	2103 (68.6)	348 (71.0)	1226 (73.9)	529 (57.8)	81.630	<0.001
Subthreshold	554 (23.9)	111 (22.7)	348 (21.0)	268 (29.3)		
Moderate	167 (7.2)	28 (5.7)	75 (4.5)	104 (11.4)		
Moderately severe	19 (0.8)	3 (0.6)	10 (0.6)	14 (1.5)		
<b>IES-R</b>						
None	955 (31.2)	153 (31.2)	583 (35.1)	219 (23.9)	87.197	<0.001
Mild	1121 (36.6)	181 (36.9)	647 (39.0)	293 (32.0)		
Moderate	703 (22.9)	110 (22.4)	325 (19.6)	268 (29.3)		
Moderately severe	285 (9.3)	46 (9.4)	104 (6.3)	135 (14.8)		

health distress. To curb this global public health crisis, healthcare providers are the most valuable resources for every country. It is crucial to assess their mental health status regularly, and provide comprehensive support to protect their well-being, including establishing a safe working environment and reasonable work schedules, providing sufficient personal protective equipment and continuous monitoring, and supervision of infection prevention strategies. Professional psychological counseling and

crisis management interventions should be made available when necessary.

This study also showed that the outbreak of COVID-19 impacted everyone. At the end of January, most of the provinces and municipalities launched level I emergency responses, the highest level for a public health emergency. In Hubei province, the epicenter of the outbreak, cities were on lockdown and public transport was suspended. Residents were required to conduct

**TABLE 2** | Characteristics of mental health status of participants (general public, frontline, and non-frontline) ( $N = 3,064$ ).

	N	Median (Interquartile range)	$\chi^2$	P-Value
<b>PHQ-9</b>				
General Public	490	4 (1–9)*1**3	91.897	<0.001
Non-frontline	1659	3 (1–7)*1**2		
Frontline	915	6 (2–9)**2**3		
<b>GAD-7</b>				
General Public	490	3 (0–7)**1**3	91.874	<0.001
Non-frontline	1659	2 (0–6)**1**2		
Frontline	915	5 (1–8)**2**3		
<b>ISI</b>				
General Public	490	4 (1–9)*1**3	61.658	<0.001
Non-frontline	1659	3 (1–8)*1**2		
Frontline	915	6 (2–11)**2**3		
<b>IES-R</b>				
General Public	490	17 (7–30)**2	68.534	<0.001
Non-frontline	1659	15 (5–26)**1		
Frontline	915	23 (9–36)**1**2		

\* $P < 0.05$ ; \*\* $P < 0.01$ ; number 1, 2, and 3 are paired groups which were compared using Dunn-Bonferroni post-hoc tests.

self-quarantine at home to contain the spread of COVID-19. They had more time to view information about the epidemic on television and online social media. The increased availability of information made the general public more aware of the situation, but it also added to their fear and anxiety. The surge in confirmed cases and deaths, the deaths of infected healthcare personnel, as well as the need for individuals to monitor their temperature and maintain strict quarantine policies, raised the public's awareness but also sent out alarm signals. Indirect exposure to extreme events through repeated presentation and overloaded information from the news media, might create distress and elevate risks for common mental health disorders (24). Meanwhile, myths and misinformation were often driven by news reports and inaccurate public health messaging. For example, rumors circulated that eating fish would increase the risk of infection because they feed on waste products of poultry and livestock which could be infected; the virus could be transmitted by a mosquito bite, etc. The overwhelming media reporting and not knowing how to discern what information is relevant can lead to panic, fear, and anxiety.

The quarantine requirement for the general public was another major issue to consider. Individuals lacked diversity in their support from others, social interactions to validate their personal perspectives and a means of expressing their concerns. They may experience boredom, loneliness and anger (4). This can increase the risk for a high prevalence rate for symptoms of psychological distress (e.g., depression, stress, insomnia, irritability, and post-traumatic stress) (25). To decrease the public's sense of uncertainty and fear in a public health crisis, government officials and the media need to provide timely, accurate and transparent information about the epidemic, emphasize the importance of self-quarantine, explain how long it will continue, provide meaningful indoor activities and practical advice on coping and stress management, ensure the

availability of basic supplies, and suggest professional support when necessary (4, 25).

The non-frontline healthcare providers also experienced psychological stressors, due to the severe shortage of personal protective equipment, which was mainly supplied to the frontline. They were worried about inadequate protection and increased risk of infection, because their patients might be in an incubation period without manifesting any symptoms of COVID-19, or hide their history of exposure to confirmed, suspected cases or epidemic areas (26). A study in Wuhan found that out of 40 infected healthcare workers, 31 (77.5%) worked on general wards (27). To prevent cross-contamination in hospitals, non-frontline departments were temporarily closed. Therefore, the workload of non-frontline healthcare providers was decreased compared with that of the frontline teams. The results also indicated that non-frontline healthcare workers had less mental health distress compared with the general public group. This may be due to the educational background of the non-frontline health providers who were able to distinguish facts from rumors compared with the general public. As a result, the providers were more likely to adapt in the midst of this public health crisis.

## STRENGTHS AND LIMITATIONS

This study described and compared the mental health status of the general public, non-frontline, and frontline healthcare in China in the early stage of the COVID-19 outbreak. It provided a wealth of information and gain a representative picture of the psychological response from a large group of population in this stress-coping period.

There are two major limitations in this study that could be addressed in future research. First, a cross-sectional study does not explore the causal relationship. Second, sampling bias

is a concern when using convenience sampling methods. The sample recruited may be systematically different from the general population, which may cause the study to be biased and limit the generalizability of the results. But gender distribution of general public participants was nearly even between males and females, and the majority of healthcare providers who responded were nurses, which in China, is almost exclusively a female occupation. Thus, the participants were still representative in this study regarding the general public and healthcare provider groups. Therefore, a longitudinal large-scale study which enrolls more male healthcare providers is necessary to explore the impact of an infectious disease outbreak and to explore possible predictors of changes in mental health status.

## CONCLUSION

The general public, frontline, and non-frontline healthcare providers experienced different changes in their mental health status. The frontline healthcare providers reported more manifestations of depression, anxiety, insomnia, and post-traumatic stress. Effective prevention and response measures are essential to address the mental health issues associated with population-wide exposure during the early phase of the COVID-19 crisis. It is necessary to assess for early outbreak associated psychological stressors in both the general public and healthcare providers, and provide professional support and actionable guidance to ease their pressures and improve mental health.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the institutional review board at Renmin Hospital of Wuhan University (No. WDRY2020-K004). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

BY and ZL have full access to all the data in the study, take responsibility for the integrity of the data, the accuracy of the data analysis, and supervision. BY, DL, QL, and QC: conceptualization, methodology, and data curation. QL and DL: writing-original draft preparation. QC, RH, and DL: software and validation. QL, DL, PC, and BY: writing-reviewing and editing. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Italian Community Psychology in the COVID-19 Pandemic: Shared Feelings and Thoughts in the Storytelling of University Students

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This study investigated how young Italian people experienced the period of peak spread of COVID-19 in their country by probing their emotions, thoughts, events, and actions related to interpersonal and community bonds. This approach to the pandemic will highlight social dimensions that characterized contextual interactions from the specific perspective of Community Psychology. The aim was to investigate young people's experiences because they are the most fragile group due to their difficulty staying home and apart from their peers and because they are, at the same time, the most potentially dangerous people due to their urge to gather in groups. The research involved 568 university students, 475 females, and 93 males, with an average age of 21.82 years (SD = 4.836). The collected data were analyzed with the Grounded Theory Methodology, using the Atlas 8.0 software. From the textual data, representative codes were defined and grouped into 10 categories, which reflect the individuals' prosocial attitudes, behaviors, and values. These categories formed three macro-categories, called: "Collective Dimensions," which includes Connectedness, Solidarity, Italian-ness, Social Problems, and Collective Mourning; "Prosocial Orientation," which includes Trust and Hope; and "Collective Values," which includes Values of Freedom, Respect of Social Rules, and Civic-Mindedness. All these macro-categories are indicative of the shared feelings experienced by Italians during the first time of the pandemic. Further practical implications of these results will be discussed, including a consideration of the risk of developing distress and improving well-being, as well as promoting preventive behaviors.

**Keywords:** emotional and action connectedness, solidarity, trust, collective mourning, COVID-19, civic-mindedness

## INTRODUCTION

This article will examine the perceived burden of the Covid-19 lockdown on the lives of young people from the specific perspective of Community Psychology.

Lewin (1936) perspective situated this discipline at the boundary between individual and social events (Amerio, 2000; Kagan et al., 2007; Orford, 2008). Therefore, its hallmark is an ecological

approach capable of analyzing the interplay of individual, relational, and social experiences (Prilleltensky, 2008; Di Napoli et al., 2019a).

We examined the COVID-19 lockdown considering individual emotions and thoughts as well as actions and significant events of individual life. In our model, we aimed to detect perceptions and representations of individuals in all their emotional and cognitive dimensions as well as the events which influence their experience, together with—for them—significant actions and behaviors (Arcidiacono, 2016). In line with this, we propose a narrative setting, capable of depicting their experience in four individual dimensions (emotions, thoughts, actions, and events). From the ecological perspective, we considered the individual domain of feelings and thoughts, that is, we took a cognitive and emotional perspective. Meanwhile, following Amerio (2000) and Ajzen and Kruglanski (2019), we considered actions as the best individual expression of the interaction with the external world; furthermore, events concern the experiences that occur around people and are the expression of the contexts in which people are immersed.

## THE LITERATURE

Lewin stated that “groups come into being not only because of perceived similarity, but because members realize their fates depend on the fate of the group as a whole” (Lewin, 1948; Brown, 1988; Townley, 2017). This certainly also applies to a community. A community can be considered in terms “of the emotional and psychological connections that exist between people and the groups they form and the means by which people communicate the idea of community—it exists through shared meaning” (Kagan et al., 2007, p. 75).

A community is characterized by the presence of some collective dimensions such as emotional connectedness and solidarity, trust, and civic values, and these assume different meanings as circumstances change. It is worth mentioning that Walker (2020) emphasizes the role of *we-ness* and of the need to create shared ties specifically in times of emergency.

### Emotional Connectedness and Solidarity

In times of crisis and social trauma such as Covid-19, individuals and families change their relationship with the social world and the community.

The journal *Nature* recently published an article on social and behavioral response to Covid-19 asserting that fighting a global pandemic requires large-scale cooperation (Van Bavel et al., 2020). In this pandemic, there are several collectives (for example, family, community, national, and international) which can make decisions to cooperate when faced with such an unexpected social event.

The awareness, fostered by fear (Pulcini, 2002), of being united with other human beings through the perception of vulnerability and weakness leads people to feel a renewed desire for bonding and generates and reinvigorates the desire for community and the need to organize themselves in forms of shared sociality, in other words, the need/desire for coexistence and for a sense of

community (Di Maria, 2000; Marta et al., 2016; Procentese and Gatti, under review).

Recent research showed that sense of community is central to a program of protecting citizens' well-being during pandemic conditions (Lie et al., 2020). Also, O'Neill (2004) stated that, as in conditions of disaster, the sense of community favors the protection of communities and that it increases when citizens are taken into consideration by their community (Lau et al., 2008).

The dimensions of the collective refer to the sense of community (SoC) defined as that “feeling that the members feel they belong, to be important to each other and to the group, a shared trust that the needs of the members can be satisfied through commitment to be all together” (McMillan and Chavis, 1986, p. 9).

The four fundamental elements that make up the sense of community are evident in this definition. The first element is the sense of belonging, which refers to a feeling of being part of a community and to the experience of emotional security that derives from this. A second concept involving the sense of belonging is identification with the community, that is, the experience of feeling adequate and well-integrated into it. Finally, the sense of belonging includes the sharing of a system of symbols, which has the main purpose of initially creating and then maintaining the sense of community.

The second element that makes up the sense of community is influence: it is a two-way concept as it is understood both as influence of the community on members and vice versa.

The third fundamental element is the integration and satisfaction of needs, that is, the members' certainty that their needs will be met thanks to belonging to the group since within it there is a sharing of the needs themselves as well as of purposes, beliefs, and values.

Studies have shown that the psychological sense of community is an important component in community initiatives. It is positively related to higher levels of well-being and associated with pro-social behaviors, civic participation, and promotion of social capital (Chavis and Wandersman, 1990; Prezza et al., 1999; Roussi et al., 2006; Pozzi et al., 2014; Ornelas et al., 2019).

In other words, community members who join together will have better chances of satisfying both their personal and their collective needs. The fourth and final element is a shared emotional connection, that is, the presence of strong emotional bonds between the members.

Coexistence is therefore favored by the sense of community that is configured as a catalyst for active, shared, and visible social participation in the entire community of belonging (Chavis and Wandersman, 1990; Hughey et al., 1999; De Piccoli et al., 2004; Christens and Lin, 2014).

Literature has effectively confirmed that SoC is associated with community participation (Florin and Wandersman, 1984; Chavis and Wandersman, 1990; Brodsky, 1996). Both community participation and SoC are interrelated key factors that promote community development and improve the chances that communities will solve problems, enhancing their internal human resources and promoting social empowerment (Talò et al., 2014).

## Trust

In a pandemic situation, social trust and institutional trust are very important issues for overcoming the crisis, as literature has widely demonstrated. Indeed, trust assumes a central role in the acceptance of recommended measures (Paek et al., 2008; Vaughan and Tinker, 2009).

Several studies have examined the role of trust during the H1N1 influenza, highlighting the importance of building public trust for promoting compliance with recommended behaviors (Gilles et al., 2011; Prati et al., 2011; Quinn et al., 2013; Freimuth et al., 2014). Moreover, Van Der Weerd et al. (2011) highlighted the fact that during the influenza pandemic (H1N1), trust in institutions increased, but trust does not always assure adherence to proactive measures. Recently, Sibley et al. (2020) reported that during the COVID-19 pandemic and lockdown, institutional trust and attitudes toward the nation and the government increased, as did trust in science, and trust in the police.

Conversely, in Italy, Stanzani (2020) observed that at the end of the lockdown, institutional trust decreased among Italians, and they only experienced high levels of trust toward activities carried out by NGOs.

This is to say that institutional trust (Lewis and Weigert, 1985; Barbalet, 2009; Luhmann, 2018) expresses judgments about the performance of institutions such as government (e.g., Hetherington, 2005).

Moreover, Rönnerstrand (2016) observed that contextual, generalized trust has been linked to immunization, in line with the literature that argues that being a trustful individual and residing in a community characterized by trust among members influences health and health behavior (Kawachi et al., 1999; Rose, 2000; Hyyppä and Mäki, 2001; Subramanian et al., 2003; Di Napoli et al., 2019b).

Finally, generalized social trust refers to trust toward generalized others who are not directly known (Bjørnskov, 2006; Nannestad, 2008), which occurs when “a community shares a set of moral values in such a way as to create regular expectations of regular and honest behavior” (Fukuyama, 1995, p.153).

Furthermore, a recent study (Imai, 2020) conducted among health workers during the Covid-19 emergency, showed that trust between organizations and workers is essential for improving work motivation and social interaction and cooperation.

## Civic Values

During a pandemic, the sharing of values has a strong impact on social shared identities.

Social values play an important role in addressing the pandemic emergency (Jarynowski et al., 2020), and one's individual perception that others share one's own social values enhances the adherence to norms and behaviors for curbing the spread of the virus (Wolf et al., 2020).

Specifically, Flanagan (2003) and Flanagan et al. (2007) introduced values with respect to civic attitudes: They defined engagement values to explain the position taken and the relative importance attributed by people to issues of a social or political nature. In their view, a constitutive element of civic values is the experience of group membership together with the experience of socialization in one's family and community in general (Sherrod

et al., 2002; Marta et al., 2010; Marzana et al., 2012; Alfieri et al., 2014). Wolf (2007) conducted a meta-analysis of civic values and found that civic values are, in order of the most widely studied to the least: political tolerance, understood as the desire to extend civil rights to all, even to groups we do not like; volunteerism, understood as the contribution of one's time to support the activities of community organizations; political knowledge, understood as the awareness of the political system, current events, and political leaders; social capital, as the extent to which a person is networked within their community; civic skills, understood as the experience in and familiarity with activities used to influence the political process; and patriotism, understood as a visceral positive connection to one's country and respect for its national symbols and rituals.

## THE RESEARCH

Giving voice to people and allowing people to express their needs and desires as well as acquiring awareness about their world are among the most significant goals of community psychology (Rappaport, 1995), rooted in Freire's conscientization 1970 and Martín-Baró's community actions 1994. It should also be recalled that in this discipline, well-being is not only an individual matter; it concerns community interactions and well-being (Di Martino et al., 2018; Di Napoli et al., 2019a). Therefore, social emotional connectedness, community interactions (Prati et al., 2016, 2020), conviviality (Procentese et al., 2019a,b), and participation (Albanesi et al., 2015; Cicognani et al., 2015; Arcidiacono et al., 2016; Churchman et al., 2016; Pozzi et al., 2017) are social pillars for understanding the psychic life. They enrich the merely individual dimensions, compounded by individual emotions and interpersonal relations that act on a family and friendship level.

Thus, at the onset of COVID-19, we decided to explore these dimensions in a group of Italian students. Specifically, we were interested in probing the inner world of young people faced with this unexpected event.

In line with the discipline's vision regarding individual well-being, we investigated how people express these dimensions.

## MATERIALS AND METHODS

### Aims and Scope

The main goal of this study was to acquire information about the lockdown experience during the pandemic and to understand its meaning and symbolization at individual, local, and national levels.

Framed within the community psychology approach, our interest was to analyze social interactions between individual and social levels during this time. Therefore, we asked our participants to talk freely about emotions, thoughts, events, and actions that they considered significant to share. They were asked to refer to their own personal experience or to feelings and actions related to their relatives, friends, or more generally attributed to this global pandemic.

The aim was to investigate young people's experience because they are the most fragile group due to their difficulty staying



home and apart from their peers and because they are, at the same time, the most potentially dangerous people due to their urge to gather in groups. Therefore, storytelling was used as a tool to collect their stories and to probe their meaning and symbolization, developing their reflectivity (Esposito et al., 2017; Salvatore et al., 2018). In fact, in our case, in line with the mission of community psychology to give voice to young people, among the most affected people by the pandemic's social implications, we asked our students to freely express their thoughts and emotions related to their lockdown experience.

Two companion papers will carefully describe their online teaching experience (Novara et al., forthcoming) and their individual feelings and thoughts (Marzana et al., forthcoming; Migliorini et al., 2021).

Here our aim is to probe emotional connectedness and shared actions undertaken by people during the lockdown.

## Participants

The recruitment of the participants took place through the mediation of lecturers in the field of community psychology at five universities in different Italian regions in the north, center, and south. Each instructor invited the students in their own course to participate in the research, filling out an online questionnaire created and distributed through the SurveyMonkey digital platform.

Data collection took place from March 24 to April 1, 2020, i.e., during the week in which the number of cases of COVID-19 contagion reached its peak in Italy.

Participants consisted of 568 university students, 475 females and 93 males, with an average age of 21.82 years ( $SD = 4.836$ ). For all participant characteristics, see **Table 1**.

## Methods and Procedures

Students were asked to describe meaningful events and actions related to their lockdown experience. In a sort of focalized approach (Arcidiacono, 2016), we gave them an open stimulus, but, at the same time, we asked them to delve into specific dimensions: in this case, emotions, thoughts, actions, and events. The text of each single student could be expressed in only a few words, totaling no more than 10,000 characters.

When filling in the form on the SurveyMonkey platform, students were asked to provide informed consent.

Those students were also offered the opportunity to receive individual actions to express social support and the take care of their own student community.

## Data Analysis

The textual material written on the online platform was analyzed by means of the Grounded Theory Methodology (GTM) (Corbin and Strauss, 2008; Charmaz and Belgrave, 2018), using the ATLAS.ti 8.0. Grounded theory, “at the most basic level (...) remains an approach in which researchers use data to develop theory from the bottom up” (Rasmussen et al., 2016, p. 23).

The process of data analysis starts after the first texts provided were analyzed. The aim was for the entire research team to share common meanings to be attributed to the written material. The preliminary coding phase started with a bottom-up approach by

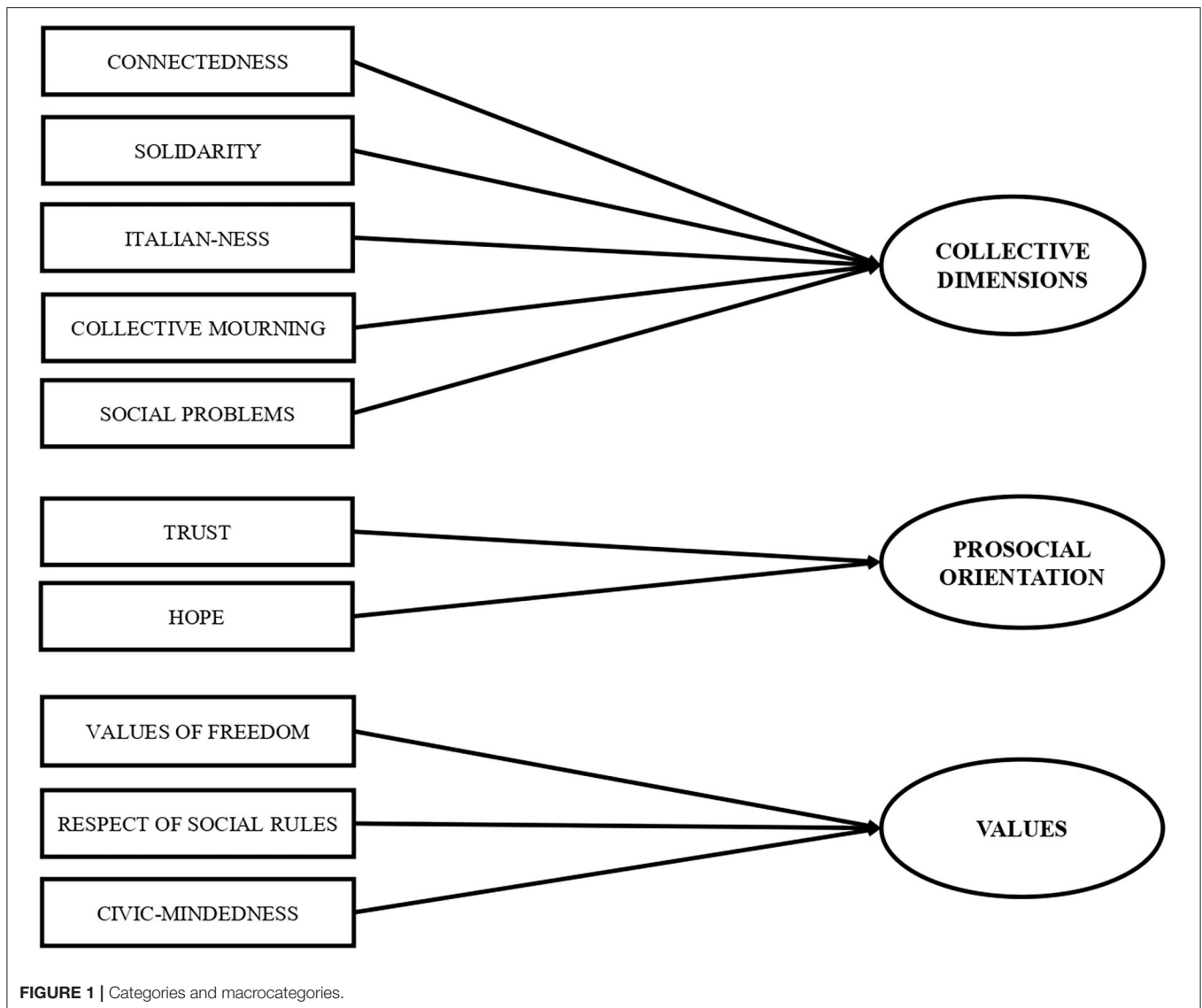
**TABLE 1 |** Characteristics of the participants.

Age	M = 21.82 %	SD = 4.836 N (568)
<b>Sex</b>		
Male	16.4	93
Female	83.6	475
<b>Territorial area</b>		
North	28.0	159
Center	10.7	61
South	61.3	348
<b>Sexual orientation</b>		
Heterosexual	91.0	517
Homosexual	3.0	17
Bisexual	5.3	30
Other sexual orientation	0.7	4
<b>Housing condition</b>		
With one or both parents	85.0	483
Alone	2.8	16
With a partner	4.4	25
With one or more roommates	3.3	19
With other family members	4.4	25
<b>University</b>		
University of Valle d'Aosta	11.4	65
Università Cattolica del Sacro CUore Milan	17.3	98
University of Florence	9.9	56
University of Naples Federico II	51.6	293
University of Palermo	9.2	52
Other Italian universities	0.7	4

coding significant words and sentences. They were then shaped into larger code groups and framed in wider categories.

Several online meetings took place, usually with the participation of 10–17 researchers. A reflexivity-based iterative process was undertaken among all team members. Notes, theoretical memos, and preliminary codes for identifying conceptual categories that shared common meanings were discussed. A reflective procedure (Esposito et al., 2017) was undertaken, in fact, researchers were asked to question themselves to better interpret the findings as they emerged from the texts. The heterogeneity of the research team—particularly in terms of age, professional background, and prior experience with GTM—was used as a resource to better interpret the content and the meaning of the texts. This shared procedure produced several subsequent coding frames, reaching a final shared categorical frame by a consensual strategy. This activity was parallel to the text coding activity that each unit brought to its material. Finally, all codes framed in the shared categories were collected in a common repository (Google Drive folder) and used to start writing the final report. After this, categories, codes and quotations were re-discussed again, and the team reached the definition of the final missing aspects. Last but not least, students of some universities were asked to share in the results.

A preliminary discussion on the collected texts was shared with the students during the course of the study. The preliminary



results were also shared with groups of students not directly involved in the research during seminars to which the researcher's team was invited.

A brief report will be provided to all students involved in the research, highlighting the principal results as well as all references to published articles through docent websites and/or Facebook pages.

## RESULTS

The results showed the presence of some sensitizing concepts in the student's storytelling (Blumer, 1969): in other words, "thoughts and hunches" that researchers have as they get started doing research.

The texts were then categorized into collective dimensions such as connectedness, solidarity, social problems, and collective mourning, but the coding also encompassed some specific

unexpected thoughts concerning national belonging that were named "Italian-ness".

The *Collective dimensions* macro-category included several different categories (**Figure 1**):

**Connectedness.** A peculiar aspect—consistent with a situation characterized by "*being in the same boat*," or, better, "*in the same storm*"—refers to sharing the same destiny: the wider community perceives, especially at the peak of the contagion, a close relationship, a "*feeling of unity when facing misfortunes*." The interdependence of fate, in the lesson learned from Lewin's contributions, is a powerful mechanism in building groups' cohesion. Especially in small local communities or in regions more heavily affected by the infection, such an aspect quickly became the high road toward achieving a great—and, sometimes, unexpected—level of social cohesion.

Other interviewees refer to aspects related to everyday life, such as sharing useful information or exchanging recipes, because

cooking was one of the favorite pastimes during the lockdown, with the sense both of expressing one's creativity and of enriching the new ritual of enjoying meals together, at the same table.

In addition, other shared suggestions concerned exercise and workouts due to the discomfort caused by the forced inactivity and the lack of movement perceived particularly in the first days of confinement, and, above all, the most important topic is the sharing of emotions: fear, worry, and uncertainty about the future.

Participants thus wrote about connectedness. They wrote about their own perceptions related to micro- and macro-belonging, and, consequently, about the cohesion experienced in their proximal networks such as their neighborhood, partner, and family: *"the value of having meals all together, around the table, at home."*

Singing and playing popular songs and hymns on balconies, toasting one another from one side of the street to the other as well as playing traditional bingo (*tombola*) socially together while standing at windows overlooking the same courtyards suddenly became the most relevant ways to express the value of *"being together."* Shared community emotional connectedness became a new social issue.

At the community level, it is then interesting to note the importance attributed to the *social cohesion* perceived in the local community, *"a great sense of community never perceived before COVID,"* even by the students who were used to spending most of their time outside the home. Social networks were an important way to feel *"far, but, at the same time, close to significant others."*

Solidarity. A possible outcome of such feelings was the growth of solidarity: *"In my opinion, people may rediscover solidarity, unselfishness, stop thinking about our own interests."*

Interviewees referred to community solidarity: even if at times it did not involve all the residents, these feelings were widely shared anyway. Solidarity was often defined as *"rediscovered humanity,"* generally referring to the local community, and was also detailed by specifying the more fragile inhabitants: the elderly, people with disabilities or previous illnesses, and those who felt *"lost in an adverse event"* or sometimes *"worthless."*

Particular attention was paid to healthcare workers and professionals: participants highlighted both the solidarity shown by them toward the whole local community and the inhabitants' appreciation for their work as *"heroes"* in pandemic times.

In addition, similar praise was expressed toward volunteers engaged in providing meals or other basic necessities, or individual protection devices, often lacking in the first phase of lockdown.

Another aspect—emerging with particular emphasis in some contexts—must be underscored: this refers to international solidarity, demonstrated by physicians coming from abroad to help the areas of Italy most seriously affected by the virus or by providing medical devices and financial support. People—and particularly some young people—generally think about other countries as producers of goods or places worth visiting and not as possible helpers.

In "normal" life participants seem to have considered solidarity as a dimension coming from lucky (healthy, medium-high income, and privileged) people toward the most

deprived individuals. During the lockdown they experienced the meaning of loss and lack of resources, rediscovering peer-to-peer solidarity.

Italian-ness. The social relationships we experience in daily life also satisfy the need to feel like full members of a community that is territorially recognized and confined in a specific physical and mental space. This feeling of being Italian, and being recognized by others as such, is what we called "Italian-ness." It includes those anthropological, cultural, and territorial characteristics that connote being Italian. It is not only a question of characters that are objectively unique to a nation, such as a symbol, a geographical border, or a founding myth; a fundamental aspect is, in fact, the common feeling which is that of being part of something bigger and more important that is independent of individual stances and, at the same time, includes them (Reicher and Hopkin, 2001).

What emerges from the research is that the pandemic connected people to the nation—and to some extent to the populace—in a renewed feeling of Italian-ness. Among the symbols, the "tricolor flag" displayed at windows and the "Italian national anthem" sung in unison from the balconies of the houses, or other songs grounded in national memory, all recurred in the texts.

Even the posters displayed on the facades of the houses, with the words "everything will be alright," had a consoling if not proactive effect. These were the actions through which the population felt less alone or rather, less isolated (probably also from the world) and "closer to all Italian citizens, as never before."

As one participant wrote: "People who get excited and sing with you in a moment of collective pain can generate reflected joy," a collective action that outlines an action of "national coping."

In summary, the pandemic bonded people to the nation in a renewed feeling of "Italian-ness," highlighting how "in an emergency there are no borders."

Social Problems. From the social perspective, the description of the problems seems to generate a certain polarity. In some cases, an intrinsically social and collective vision of the problem prevailed: *"... the current situation of many Italian families left without work and in poverty...;" "... how complicated the situation is in general...;" "... in the elderly in the family, progressively more and more alarming data have generated a strong fear for the future of the country...;" "Isolation, necessary for physical health issues, in the long run risks damaging people's mental health."*

On the other hand, there were many expressions of identification with others, where social concern focused on the individual suffering of the other; therefore, the summative character of the sufferings of the individual emerges as social. In this regard, the texts collected presented a great deal of narrative expressing attention to social problems: *"Yesterday in my city's hospital, an elderly man committed suicide because he had been infected and was afraid of having infected someone else. I'm afraid these episodes will occur again;" "This made me think of how many people are now alone and at greater risk."*

The variety and intensity of this meaning can also be encapsulated entirely within this single statement: *"Anxiety from*

*multiple points of view, for people who are in hospitals and therefore disabled by the virus, for doctors, nurses, healthcare and law enforcement workers, for my grandparents who are elderly, for all those people who unfortunately do not have the means to be safe and for our Italy which has been brought to its knees.”*

Collective Mourning. The Social Mourning dimension seems above all to emphasize the emergence of the community meaning of death, as opposed to the contemporary tendency to consider death as a private event and mourning as a personal elaboration. What is represented in participants' texts, therefore, is not only a fact in itself, but above all the novelty, the surprise, the difference compared to usual living conditions.

In this sense, some aspects appear to be significant. One of these is the frequency with which participants speak about the death of strangers. Fortunately, this is also probably related to a low incidence of family mourning, but the recurrence of this theme underlines the impact at a community level including for the many people not directly involved: “...seeing all these people die so much that they no longer have room in cemeteries...;” “...the pain of all of us sitting on the sofa and hearing the number of deaths every day took away our desire to speak, to smile, people were dying...;” “The line of military vehicles leaving the Bergamo hospital.”

An interesting feature of these statements is that, although they are about strangers, the categories of meaning and the discursive styles of the private dimension of mourning and personal pain are mainly used, as if attuning to the families of the deceased strangers. In the discourse, there is therefore a point of contact between the collective entity of events and the affective and family sphere for the attribution of meaning: “...he was in a coffin ready to be cremated without family members having the opportunity to say farewell to him and to be celebrated with dignity...;” “The impossibility of saying goodbye to the deceased for those who have lost someone.”

Another element that seems to refer to the community dimension of mourning is the frequency with which the images of the coffins and the line of military vehicles in Bergamo are recalled in the various cities, even distant ones. This refers to a visual representation of experiences conveyed by the mass media. However, this aspect can also be taken for a better definition of the experiences of mourning, because sometimes addressing loss appears in the private dimension, linked to the direct experience of the participants: “Death of a friend of my mom;” “One event that surely struck me was the news of the death caused by the coronavirus of a neighbor of my grandmother’s.” In other cases, the absence of mourning in a social sense and of a community ritual concerning “stranger” mourning, portrayed in the images of military trucks in Bergamo, seems to be emphasized. In this sense, it can be assumed that there is a subtle dissonance between amplified public representations, such as those conveyed by the media, and underestimated individual experiences or direct experiences of mourning.

Finally, in some cases, the speed of contagion transmission number was associated with the Social Mourning macro-category. This occurrence may suggest the profound impression aroused not only by the extent of the losses, but above all by the occurrence, a rampant emergency, coming so fast as

to cause anxiety with respect to our practical possibility to combat it.

Collective values. The *Collective values* macro-category includes different categories that refer to behaviors, attitudes, or values related to respect for other people, the rules of living in a community, respect for the rules and responsibility as well as Values of Freedom and civic-mindedness. Civic sense, for example, collects the codes referring to “*staying at home*” as a form of respect for the rules such as adherence to restrictions required by institutions: “*An action that emerges as crucial in this period I believe is respect for the rules and decrees issued. Respecting rules and decrees, being selfless while staying at home.*” Participants, therefore, stated opinions concerning a sense of justice. They referred to the failure of some people to comply with the rules, an injustice toward those who, conversely, did not transgress them. The lack of collective values is connected to this aspect of justice, and it is expressed as individualism, selfishness, and a lack of responsibility.

This refers to an attitude of focusing on oneself and one's needs while ignoring those of others: “*Different people can't help putting their personal needs before collective needs,*” which is reflected in behaviors that denote a lack of respect for the community and negligence in people's behavior.

Some examples of these behaviors are escaping lockdown by train to return home, moving from the so-called “red zones” of Italy, which were considered highly contagious, and irresponsible shopping in supermarket to get as many items as possible. “*The selfishness of these people makes me understand that there is no emotional bond that holds. Faced with the fear of dying these people would also sell their soul to the devil; egoism has never brought benefits to society and to the individual lives of people. I cannot understand how all this can happen without thinking in the least about who is on the other side.*”

An important value on which the interviewees focused was freedom. During this period of lockdown, this assumed the connotation of “*rediscovered value.*” Freedom became a fundamental dimension in daily life, very often taken for granted; it took on great importance when it was taken away from us.

Last, particular attention was paid to the dimension of the environment. Many participants wondered about the effect that the pandemic would have on nature, often speaking of “*the world that is being purified*” and “*planet earth that is reborn,*” coming to the conclusion that “*the negative experience for human beings is becoming positive for nature.*”

## Prosocial Orientation

The *prosocial orientation* macro-category contains two different categories: trust and hope. As far as trust is concerned, the interviewees declared that this state of emergency had increased their confidence and has made them conscious of the importance of trusting their fellow citizens, humanity, and, above all, the public institutions: “*Increasing trust in others is a fundamental premise for moving forward and overcoming the crisis situation.*”

Trust in fellow citizens is basically considered as very important for empowering everybody to adopt precautionary behaviors to protect themselves and other people: “*We really need*



*this type of trust which is trust in others. To believe that people really realize what we are currently experiencing.”*

Moreover, the students refer to an increased confidence in public institutions, above all in the Prime Minister, thanks to the closeness and understanding that the institutions showed toward the citizens: *“Then, leaving aside any political opinion, I’ve been impressed—positively this time—by the governmental promptness in sending out a message of strength, safety, and trust.”*

Great confidence and recognition were expressed for the Italian lockdown model since it displayed an emphasis on care: *“I felt relieved and a little bit reassured because I had the feeling that the state was putting in place actions and that we as a people were not alone at the mercy of the disease.”*

Trust in the authorities also increased gratitude for the presence of checks on compliance with the lockdown: *“Something positive that I have noticed is the high number of checks that the police are carrying out. In my neighborhood I see police cars passing continuously and stopping passers-by and cars.”*

However, there is a portion of the students who show distrust toward fellow citizens and authorities regarding the management of the emergency. The distrust is mainly toward careless attitudes adopted by other inhabitants and institutions: *“Ignoring the rules imposed by the authorities regarding the coronavirus emergency, it makes me lose esteem and trust in our society.”*

For some of the interviewees, a symbol of hope is represented by the drawings that Italian children made, recognized as symbols of positivity toward the future; children’s drawings were also represented as a trigger for serenity, relieving the worries and sadness of the lockdown period.

The saying *“#andràtuttobene”* (#everything will be alright) became a symbol of an individual and collective hope of recovering and returning to normality.

The *hope* category, as an emotional future-directed network, describes what the subjects desired right after the emergency phase.

Hope, however, carries different attributes for the interviewees. Some of the interviewees hope for a revolution compared with what existed before the onset of COVID-19, that is, the possibility of adopting new and different ways of living in the future. Thus, hope for the revolution means importing new ways of establishing interpersonal relationships, taking care of the most vulnerable, having greater care for the environment: *“To rebuild a new a world. More creative. More responsible. More aware. More true. More united. I do not want normality anymore. I want a masterpiece;” “... I wish that this moment would bring a real revolution. Inside and outside ourselves. I want to learn the lesson of this hard moment. I do not want to ever lose any bit of what was taught.”*

For some youth, hope will return when they can resume living as in prior everyday life, before the COVID-19 emergency: *“I hope this moment will pass soon. Panta rei that is “everything flows” as an important ancient Greek philosopher used to say, so I wish that the stress that our country is suffering will weaken soon;” “Hope that everything will end soon is strong.”*

Then some of the interviewees refer to the lack of hope as the inability to imagine themselves in the future. Inability to

foresee when the emergency will end makes the interviewees afraid and discouraged.

## DISCUSSION

The coffins left behind in the Bergamo morgue continuously broadcast by media for several days was the image also reported by the frequent dreams (Iorio et al., 2020) that best expressed the dimension of collective mourning; conversely, people talking to each other from balconies was the voice of connectedness. Here visual representations give us the symbolic meaning shared by our respondents. We can, therefore, consider this two-fold image as a core category encompassing shared meaning attributed to this pandemic at the community level. The lines of coffins and people singing and toasting from balconies, respectively express this emotional sharing of collective mourning and the need to express shared feelings of connectedness. In this case, we assumed as a core category not a sentence or a word but two visual images reported by the texts, and it is worth mentioning how visual communication expresses feelings and thoughts (Arcidiacono et al., 2016). At the beginning of the lockdown, this aspiration to share and stay connected was the first spontaneous reaction to the media reports of deaths and infections. Signs of reciprocal solidarity were also expressed and described.

According to Walker (2020), “Psychological research suggests that being in an emergency can create a common identity amongst those affected. Emergencies appear to at least temporarily dissolve social division as the development of this identity facilitates a degree of cooperative altruism even when amongst strangers in life-threatening situations” (p. 4).

Confirming what was reported in the introduction, in the words of the participants, the renewed desire for bonding and community was evident in response to the situation of collective trauma (Ntontis and Rocha, 2020). In fact, unity strengthens the belief in a greater ability to cope with the emergency. It is not trivial to point out that this rediscovered unity also occurred through the recovery of some traditions (social games, cooking, etc.), which represent an anchor to something known, something that does not change (even down through generations) in a time when lives are turned upside down. It is interesting that at a time when the need for freedom and escape is curtailed, tradition retains its consoling meaning for the community, which is to cling onto certainties while adapting them to new needs, even when these are completely unusual and unpredictable.

We have also found this renewed interest in bonds in what we could define as behavioral solidarity toward humanity. In particular, it places the most isolated social categories (such as the elderly, the homeless, etc.) or professional categories less valued by government policies (i.e., doctors, nurses, and the whole health system) at the center of attention and collective sensitivity.

We also found that the epidemic led individual citizens to have a shared emotional experience and to develop a social identity that we have called Italian-ness. In fact, in line with the Intergroup Emotions Theory (Smith and Mackie, 2015), this dramatic event, even if it involved the Italian regions to a different degree, triggered group-based emotions in Italians.

These common emotions were independent of the individual level and were linked by a sense of belonging to a common identity. As studies of people exposed to emergencies suggest (Drury et al., 2016, 2019), sharing the crisis situation fostered a sense of belonging among individuals, which was managed to overcome the profound differences that characterize the different regions of the national territory.

This identity was also strengthened by the fact that Italy was at that time the only European country to be severely affected by the epidemic. In fact, during the period in which the data were collected, there was an image, fueled by fear and by social media, of Italians as spreaders of the virus. As postulated again by the Intergroup Emotions Theory (Smith and Mackie, 2015), this discriminatory experience favored social identity thanks to opposition to an outgroup represented by other European countries.

In addition, as Dovidio et al. (2020) argue, the delocalization of the virus that has affected the entire globe and configured itself as a global threat has exported the threat out of the ingroup of belonging, lowering the level of intra-group conflict. This could explain the generalized and newly found trust in the “Other,” which at a higher level of categorization creates a common ingroup identity to which one belongs (Gaertner et al., 2016). In this way, respondents “recognize people are the solution, not the problem” (Jetten et al., 2020, *ivi*, p. 11). In fact, they become the problem when they do not respect the civic norms that protect the global community, of which everyone—during the pandemic—feels they can be part. The Other, then, can also be a source of mirroring and not just identification (Novara et al., 2019), awakening an empathic capacity that we find in the feeling of collective mourning, in the concern for the economic difficulties of some families, for the risk that workers in the field run, for the community. All these things—as some say—will need to be taken better care of in the future, including reawakening environmental responsibility.

Moreover, in line with literature (Rönnerstrand, 2016; Sibley et al., 2020), there is an increased sense of trust in political institutions in which the interviewees recognize an attitude of care and attention, as well as toward other citizens. Therefore, trust for interviewees is a necessary condition for overcoming the crisis situation.

Finally, it is interesting to note the feeling of hope (Solnit, 2020) in the results regarding not only the prospective image of how we will live together after COVID-19 but also the retrospective image of how we will live in the future based on what has been in the past: conscious collective learning.

Indeed, hope, despite being little explored in its implications in a pandemic situation, is a very important issue, moreover considering it as a socially constructed emotion connected to the quality of life (Scioli, 2007).

This was probably also the benefit of the storytelling method that we used in the research: It allowed the interviewees not only to report their experiences but to narrate them in the psychological sense, accessing an emotional and meaningful elaboration of their experiences, and we know how much this can promote preventive and caring behavior during mass emergencies.

Finally, this study confirms that young people are attentive and sensitive to social issues, as elsewhere described (Alfieri et al., 2019) and have developed a concern for community.

## Limits

This research is not without limits. This study collected experiences of students, and in the classes we included, there was a greater number of females. The number of participants also differs among various universities, but it is quite balanced among the northern, southern, and central regions of Italy. Furthermore, the participants are university students studying in humanities departments; therefore, the sample does not represent all Italian university students and young Italians, more broadly.

In a future study, it would be interesting to develop situated differences among young Italians of different social contexts and to compare the results with youth from other countries facing the pandemic with different strategies.

## CONCLUSION

This study reveals the initial emotions, thoughts, and actions undertaken at a collective level by students of the North, South, and Center of Italy. Its value is to grasp the primary reaction to the lockdown emergency. It highlights how around Italy, people undertook actions aimed at maintaining continuity among people and overcoming the forced closure of society. For us, as community psychologists, this need for connectedness expresses how community interactions are the pillar of social life.

In this vein, Italian-ness may be understood as a form of shared national identity that makes possible a common identity. Furthermore, the many references to the whole world and environmental needs demonstrate a wider social identification with our planet and all human beings.

Referring to the Elaborated Social Identity Model (ESIM) of crowd behavior developed by Cocking et al. (2009), Carl Walker suggests that it is a “common identity that can result in people helping and supporting each other, even if they are complete strangers. Coronavirus functions in a similar way, positioning groups of people as being under attack from a common and indiscriminate enemy” (2020 p, 4). Therefore, it is not surprising that connectedness actions were among the first collective reactions for our students.

Similarly, solidarity occupied a significant place in collective descriptions of our respondents: “Evidence from a range of different disasters in different countries (Drury et al., 2019) confirms the link between a sense of shared fate and shared social identity, and also between emergent social identity and solidarity” (p. 104).

Narratives coming from the data collected show communities at first astonished and then frightened by the persistence of the contagion. Suddenly, disease and death pervaded everyday life. The psychosocial and collective response, in order to restore an acceptable threshold of well-being—according to Nelson and Prilleltensky (2010) and Prilleltensky (2008)—was to make sense of the whole experience and to undertake all the behaviors needed to care for mental and social health. In the face of social distancing, affecting the opportunities for closer and physical

relationships, alternative measures were imagined: virtual connectedness, sense of cohesion expressed by shared rituals (playing, singing, toasting, etc.), organization of community and neighborhood support, first of all, addressed toward the most fragile citizens, such as—for opposite reasons—young people who wished to meet peers and elderly people, heartbroken by the loneliness and by the perceived risk of infection. Creativity advanced in order to provide unusual and effective actions for increasing mutual caregiving, individual and community health and well-being, and sense of community (Chavis and Wandersman, 1990; Talò et al., 2014) in adverse events.

The complexity and depth of these data show the potentiality of storytelling as a tool that offered the students the opportunity to re-think and reprocess traumatic events, a space to rework them. It has proved to be a tool that not only has value in itself but also for the effects it had. Storytelling helped the young people build a meaning into their experiences, to elaborate fears but also to give voice and creative expression to those experiences. Storytelling empowered young people and was a powerful way to improve their overall wellbeing.

From a community psychology perspective, in line with the COVID-19 Statement of EFPA ECPA, 2020, we hope that some collective feelings described by our young Italian respondents during the pandemic will build “new ways of understanding the networks of communities we are part of.” Building trust and solidarity is a long-term process, involving public and private sectors (Capone et al., 2020; Procentese et al., 2020). Communities in many countries are amazingly active in

strengthening their feeling of belonging and building new forms of community. Helping to preserve the treasure of engaged, creative, and home-grown ideas and “popup”-solutions will be important if we want to maintain the sense of community and co-creation, which is emerging in our societies.

Therefore, it is to be hoped that these preliminary considerations on the COVID-19 lockdown experience will reach a larger audience and therefore become a lever for social change as the special issue proposed by Castelnuovo et al. (2020) intends to do.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University Federico II, Department of Humanities, Ethics Board for Research in Psychology. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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# Mood Disorder in Cancer Patients Undergoing Radiotherapy During the COVID-19 Outbreak

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**Introduction:** Novel coronavirus (COVID-19) is having a devastating psychological impact on patients, especially patients with cancer. This work aims to evaluate mood disorders of cancer patients undergoing radiation therapy during COVID-19 in comparison with cancer patients who underwent radiation therapy in 2019.

**Materials and Methods:** We included all the patients undergoing radiation therapy at our department in two-time points (once a week for a month in May 2019) and during the COVID-19 outbreak (in April 2020). All the patients were asked to fulfill a validated questionnaire (STAI-Y1, State trait anxiety inventory scale), the Symptom Distress thermometer (SDT) (from 0 to 10 score), and the Beck Depression Inventory v.2 (BDI-2). We took into account the COVID-19 outbreak and also sex, age, week of radiation treatment, and disease.

**Results:** We included 458 patients (220 males and 238 females), with a median age of 64 years. STAI-Y1 median score was 40 (mean 41,3, range 19–79), whereas the median score of SDT was five and BDI-2 median score was 11. STAI-Y1, SDT, and BDI-2 were significantly correlated with the COVID-19 outbreak ( $p < 0,001$  for all the tests), sex ( $p: 0,016$  for STAI-Y1,  $p < 0.001$  for SDT,  $p:0.013$  for BDI-2), week of treatment ( $p: 0.012$  for STAI-Y1 and  $p: 0.031$  for SDT), and disease ( $p:0.015$  for STAI-Y1,  $p < 0.001$  for SDT and  $p:0.020$  for BDI-2).

**Conclusions:** The prevalence of mood disorders in patients undergoing radiation therapy is higher than expected and even higher during the COVID-19 outbreak. These measurements could be useful as a baseline to start medical humanities programs to decrease these scores.

**Keywords:** mood disorders, COVID-19, radiotherapy, cancer, anxiety, depression

## INTRODUCTION

Since WHO announced the novel coronavirus (COVID-19) outbreak as a pandemic on 11th March, the virus has reached more than 4 million cases and 300,000 deaths all over the world (Laghi and Grassi, 2020; Neri et al., 2020).

Notably, the psychological effects of COVID-19 on both patients and healthcare workers could be serious and deserves a systematic investigation (Belfiore et al., 2020; Huang and Zhao, 2020; Tsamakidis et al., 2020).

A cancer diagnosis often implies extensive emotional, physical, and social suffering, therefore current cancer management should incorporate different psychosocial interventions to improve patients' quality of life (Zimmermann-Schlegel et al., 2017; Senf et al., 2019).

In this context, it is easy to imagine the potential threats of the COVID-19 outbreak on the psychological well-being of cancer patients.

Currently the radiotherapy community is focused on providing responses to face the different issues of this critical period (Coles et al., 2020; Grassi et al., 2020; Guckenberger et al., 2020; Rinaldi et al., 2020; Scorsetti et al., 2020; Zaorsky et al., 2020), but the management of psychological disorders has not been evaluated yet.

This work aims at the prevalence of mood disorders (anxiety, distress, and depression) for cancer patients undergoing radiation therapy during the COVID-19 outbreak in comparison with patients treated in 2019.

## MATERIALS AND METHODS

### Population

The Institutional Review Board (IRB) approved the survey and protocol.

Patients undergoing RT were prospectively enrolled in the present study in two-time points (once a week for a month in May 2019) and during the COVID-19 outbreak (once, in April 2020).

Inclusion criteria were as follows: written informed consent concerning treatment risk, psychological test agreement, and age > 18 years.

### Procedure

In the two time periods chosen, all the patients that underwent radiotherapy on the days when the tests were collected (once a week for a month for time point 1 and once for period 2) were included in the present evaluation. During treatment all the patients are visited every week from the clinician, in order to evaluate acute toxicity and radiotherapy side effects. Before the visit, the patients performed a self-administered psychological evaluation according to the described instruments. Demographic and clinical variables registered were sex, age, disease, and week of radiation treatment.

### Instruments

Three validated patient-reporting tests were used: the State version of anxiety inventory scale (STAI-Y1), the Symptom

**TABLE 1 |** Characteristics of the two cohorts of timepoints.

Parameters	Time point 1 (Pre Covid-19)	Time point 2 (Covid-19 Outbreak)	Statistical analysis (Chi-square test)
<b>Sex</b>			
Males	181 (47.6%)	39 (50%)	$p:0.711$
Females	199 (52.4%)	39 (50%)	
<b>Age</b>			
<50 years	50 (13.2%)	13 (16.7%)	$p < 0.001$
50–70 years	192 (50.5%)	58 (74.4%)	
>70 years	138 (36.3%)	7 (9%)	
<b>Disease</b>			
Gastrointestinal	51 (13.4%)	6 (7.7%)	$p:0.543$
Brain	39 (10.3%)	6 (7.7%)	
Breast	121 (31.8%)	30 (38.5%)	
Lung	15 (3.9%)	6 (7.7%)	
Prostate	58 (15.3%)	13 (16.7%)	
Head and Neck	66 (17.4%)	12 (15.4%)	
Other/Palliative	30 (7.9%)	5 (6.4%)	
<b>Week of treatment</b>			
First week	87 (22.9%)	20 (25.6%)	$p:0.659$
Other	293 (77.1%)	58 (74.4%)	

Distress Thermometer (SDT), and the Beck Depression Inventory vers.2 (BDI-2).

The STAI-Y1 is a self-report measure with 20 items to assess state anxiety, with each item evaluated on a 4-point Likert scale. A cutoff point of 40 has been suggested to detect clinically significant symptoms for scale (Knight et al., 1983; Julian, 2011).

The SDT is an 11-point scale with endpoints labeled “no distress” (0 points) and “extreme distress” (10 points) (Distress Management, 2003).

For SDT, a cutoff point of 4 was chosen, based on the scores of the Hospital Anxiety and Depression Scale and Brief Symptom Inventory 18 (Jacobsen et al., 2005).

The BDI-2 is a validated tool for patient mood assessment and has been developed to investigate the presence and degree of depressive symptoms.

The BDI-2 is a 21-item self-administered questionnaire, with each response scored on a scale of 1–3. All the scores are summed to give the BDI score. A BDI-2 score of 0–13 indicates minimal symptoms, 14–19 mild symptoms, 20–28 moderate symptoms, and 29–63 severe symptoms (Beck et al., 1996).

### Statistical Methods

Differences in patients' characteristics (sex, age, disease, week of treatment) between the two time points were evaluated with the Chi-square test in order to compare the two cohorts of patients (see Table 1).

### Univariate Analysis

The three scales were analyzed as continuous data. Student's *t*-test was used in univariate analysis to assess differences in

scales according to patient-specific variables (sex, age, week of treatment) and between the two timepoints (pre and during COVID-19).

A sensitivity analysis was performed considering the three scales as categorical items with cut-offs corresponding to those indicated for each instrument. Chi square test was used to assess association with the two timepoints.

### Multivariate Analysis

All the parameters (sex, age, week of treatment, COVID timepoint) were considered in a linear regression analysis with a stepwise method. For the linear regression analysis, the nominal parameter “disease” was categorized as a dummy variable.

The three scales were considered dependent variables and the parameters sex, age, week of treatment, disease, and timepoints were considered as independent variables.

A two-tailed  $p$ -value  $< 0.05$  was considered statistically significant.

All the statistical analysis was performed on SPSS v.23.0.

## RESULTS

### Population

We included 458 patients (220 males and 238 females), with a median age of 64 years (mean 63,9 years, range 29–88 years), tested before COVID-19 (380 patients, 83%) and during the COVID-19 outbreak (78 patients, 17%) (see **Table 1** for the characteristics of enrolled patients).

The two cohorts of patients showed a significant difference in terms of age, probably due to the selection of patients during the COVID-19 outbreak.

### Instruments

STAI-Y1 mean score was 41.3 (standard deviation 10.89), with 227 patients (49.6%) showing a STAI-Y1  $< 40$ .

SDT mean score was 4.6 (standard deviation 2.55), with 211 patients (46.1%) showing a low anxiety score on SDT ( $< 4$ ).

BDI-2 mean score was 13.8 (standard deviation 10.10). A total of 297 patients were categorized as minimal score (64.8%), 80 as mild score (17.5%), 46 as moderate score (10%), and 35 as severe score (7.6%).

Differences were found in all three scores between the two timepoints, highlighting the worsening of mood disorders during the COVID-19 pandemic (see **Table 2**).

### Univariate Analysis

A linear regression model was used to evaluate the association between each instrument and the other variables considered.

STAI-Y1 was correlated with the COVID-19 outbreak ( $p < 0.001$ ) being higher post COVID-19 outbreak, sex ( $p:0.016$ ) being higher for female patients, and week of treatment ( $p:0.012$ ) being higher in the first week of treatment.

SDT, similarly, was correlated with the COVID-19 outbreak ( $p < 0.001$ ), sex ( $p < 0.001$ ), and week of treatment ( $p:0.036$ ).

BDI-2, finally, was correlated with the COVID-19 outbreak ( $p:0.005$ ) and sex ( $p: 0.013$ ).

**TABLE 2 |** Differences among the three tests in the two cohorts of timepoints.

Parameters	Time point 1 (Pre Covid-19)	Time point 2 (Covid-19 Outbreak)	P-value*
<b>STAI-Y1</b>			
<b>(Continuous data)</b>			
Mean	40.24	46.51	$p < 0.001$
Standard Deviation	10.39	11.82	
<b>SDT</b>			
<b>(Continuous data)</b>			
Mean	4.35	5.88	$p < 0.001$
Standard Deviation	2.50	2.42	
<b>BDI-2</b>			
<b>(Continuous data)</b>			
Mean	13.27	16.7	$p:0.005$
Standard Deviation	10.02	10.06	
<b>STAI-Y1</b>			
<b>(Categorical)</b>			
$< 40$	216 (56.8%)	29 (37.2%)	$p: 0.0015$
$\geq 40$	164 (43.2%)	49 (62.8%)	
<b>SDT</b>			
<b>(Categorical)</b>			
$< 4$	184 (48.4%)	27 (34.6%)	$p: 0.025$
$\geq 4$	196 (51.6%)	51 (65.4%)	
<b>BDI-2</b>			
<b>(Categorical)</b>			
Minimal score	262 (68.9%)	35 (44.9%)	$P < 0.001$
Mild score	57 (15%)	23 (29.5%)	
Moderate score	33 (8.7%)	13 (16.7%)	
Severe score	28 (7.4%)	7 (9%)	

\*P-value was relative to Student's t-test for continuous variables and chi-square test for categorical items.

### Multivariate Analysis

Multivariable linear regression analysis showed that all the significant parameters associated with STAI-Y1 also maintained their significance when considered in the same model: COVID-19 outbreak ( $p < 0.001$ ), week of treatment ( $p: 0.001$ ), and sex ( $p: 0.015$ ).

For SDT, similarly, the only significant parameters are COVID-19 ( $p < 0.001$ ), disease ( $p:0.001$ ), and sex ( $p:0.004$ ). The diseases that showed a higher SDT were brain cancer, head and neck cancer, and lung cancer, whereas all the remaining cancer diseases showed a lower SDT (see **Figure 1**).

For BDI-2 the only significant parameters remain COVID-19 outbreak ( $p: 0.004$ ) and sex ( $p:0.011$ ) (see **Table 3; Figure 1**).

## DISCUSSION

The psychological distress related to the diagnosis of cancer can be devastating for the patients and their relatives (Lim et al., 2013), with responses that include denial of the diagnosis, fear of death, fear of recurrence of cancer, concerns about body image,



**TABLE 3** | Linear regression analysis was used to correlate all the variables with the test STAI-Y1, SDT, and BDI-2.

Dependent (Linear regression)	Parameter	p-value	B
<b>STAI-Y1</b>	(constant)		
	<b>Covid-19</b>	<b>&lt;0.001</b>	0.24
	<b>Week of treatment</b>	<b>0.001</b>	-0.15
	<b>Sex</b>	<b>0.015</b>	0.10
	Age	0.112	0.07
	Disease	0.070	-0.08
<b>SDT</b>	(constant)		
	<b>Covid-19</b>	<b>&lt;0.001</b>	0.26
	<b>Disease</b>	<b>0.001</b>	-0.15
	<b>Sex</b>	<b>0.004</b>	0.13
	Age	0.803	0.01
	Week of treatment	0.057	-0.11
<b>BDI-2</b>	(constant)		
	<b>Covid-19</b>	<b>p:0.004</b>	0.13
	<b>Sex</b>	<b>p:0.011</b>	0.12
	Age	0.826	-0.01
	Week of treatment	0.951	-0.01
	Disease	0.565	-0.03

*Bold values are significant parameters.*

as well as impacts on sexuality, relationships, and lifestyle (Zabora et al., 2001; Schouten et al., 2019).

A mood disorder may be part of the reaction to the news of a cancer diagnosis, but in many patients it will persist, causing an additional burden of disease (Hopwood and Stephens, 2000).

Conversely, the illness itself or the cancer treatments may lead to a radical modification of patients' everyday life activities, especially in cases of advanced illness (Zaza et al., 2005). These conditions can have a relevant impact on patients' quality of life (Tang et al., 2017) and eventually induce mood disorders such as psychological distress, anxiety, and depression (Andersen et al., 1984; Andersen and Tewfik, 1985; Stiegelis et al., 2004; Bradt and Dileo, 2010).

Cancer patients undergoing radiotherapy represent an even more fragile population that is associated with increased levels of anxiety and depression that is often under-detected and undertreated (Stiegelis et al., 2004), as frequently this population of patients has not regained the optimal psychological and physical conditions from previous treatments (de Graeff et al., 2000; Monga et al., 2005). A significant percentage of radiotherapy patients, in fact, is subjected to different types of therapies in the previous months (such as surgery possibly followed by chemotherapy in a subset of breast cancer patients, induction chemotherapy in a subset of lung or head and neck cancer, and so on).

At the same time, early alarming reports have suggested that patients with cancer seem more likely to develop severe COVID-19 (Liang et al., 2020), and patients undergoing radiotherapy are also required to make daily visit hospitals for some weeks, with an increased risk of contagion.

Salari et al. have recently performed a meta-analysis to investigate the prevalence among the general population of

stress, anxiety, and depression (Salari et al., 2020). The authors found that the prevalence of these disorders was, respectively, 29.6, 31.9, and 33.7%, so it is essential to develop psychological interventions to improve the mental health of the population during the pandemic. Xiong et al., in a similar study, found that the risk factors associated with the mood disorders include female gender, younger age (<40 years), presence of chronic illnesses, student status, and frequent exposure to press news concerning COVID-19 (Xiong et al., 2020).

Vindegard et al., conversely, investigated the consequences of COVID-19 on mental health and found lower psychological well-being and higher scores of anxiety and depression vs. before the pandemic, with no differences among the initial phases of the outbreak to a month later (Vindegard and Benros, 2020). Poor self-related health was, again, recognized as a risk factor with higher risk of mood disorders.

The points just discussed can shed light on our results which show that during the critical period of the COVID-19 outbreak patients undergoing RT develop increased depression, anxiety, and distress, according to all the tests used.

The incidence of depression in cancer patients varies considerably among the different studies, ranging from 7 to 49% (Derogatis et al., 1983; Jenkins et al., 1998; Kai-hoi Sze et al., 2000; Pascoe et al., 2000).

Hahn et al. performed a routine screening for depression in radiation oncology patients and they found that only 15% of patients endorsed significant depressive symptoms (Hahn et al., 2004). Conversely, Kawase et al. investigated a homogeneous cohort of 172 patients with early-stage breast cancer and found that 42% of the patients showed depressive disorder (Kawase et al., 2012).

Alacacioglu et al. also investigated depression and anxiety levels in cancer patients and discovered that nearly half of the patients showed mild and severe depression (respectively 29.1 and 18.2%) (Alacacioglu et al., 2013). Both depression and anxiety were higher in women, in people with low socioeconomic level, and in patients with a relapsing disease.

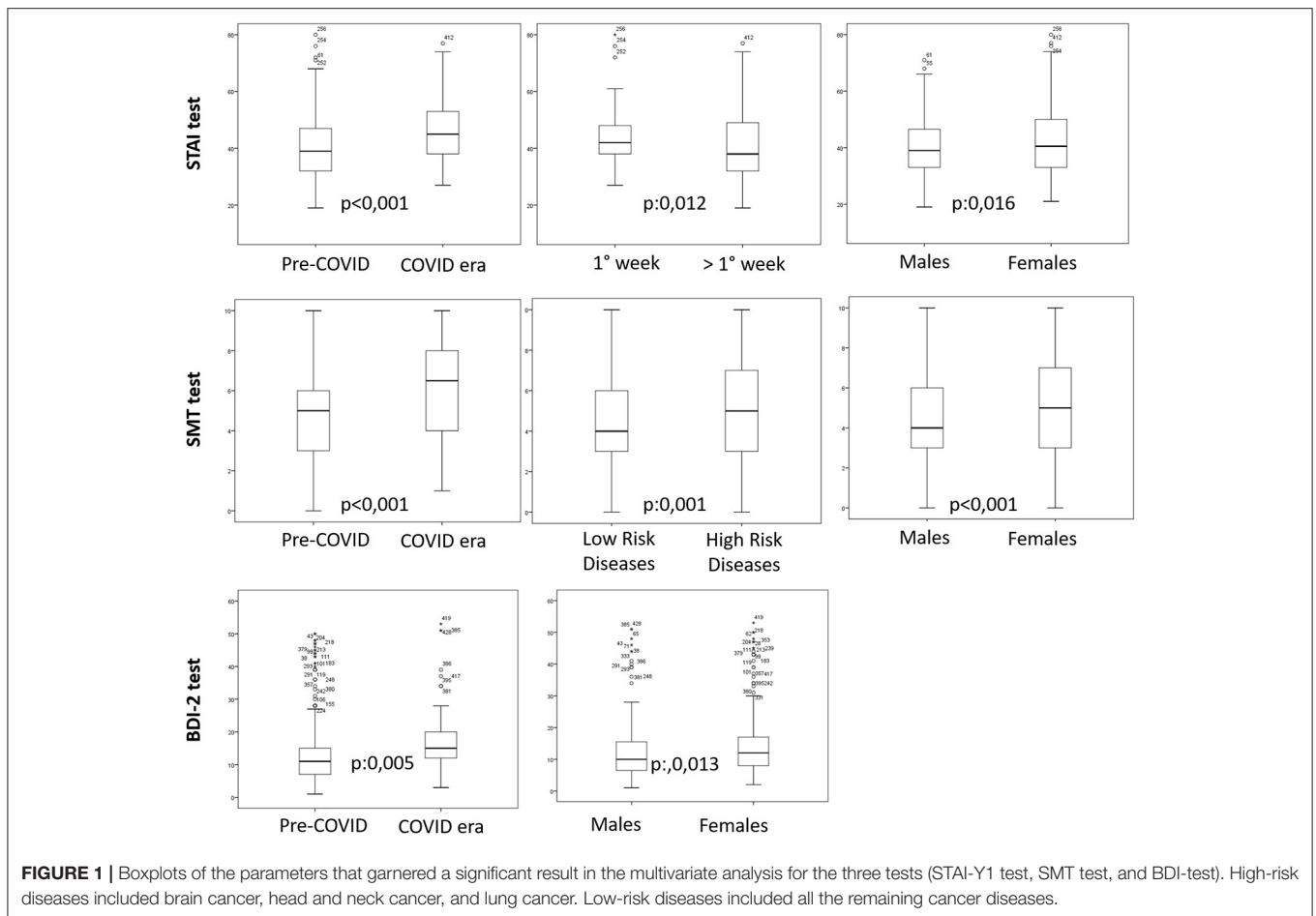
Katz et al., conversely, investigated the depression in head and neck cancer patients undergoing radiotherapy and found that the prevalence of Major and Minor Depression was 20% (Katz et al., 2004).

The RTOG 0841 trial has recently investigated the use of screening for depression in cancer patients receiving radiotherapy in a multi-institutional setting (Wagner et al., 2017). The cohort of patients included 455 patients with different diseases; 75 patients (16.5%) exceeded screening cut-offs for depressive symptoms and were further investigated.

Our results, thus, are consistent with the literature, although the prevalence of depression among cancer patients is variable among the different studies, due to the choice of tests adopted and the differences in the cohorts of analyzed patients.

In regard to anxiety, a review of RT studies indicated that a significant percentage of patients showed clinically significant levels of anxiety at the initiation of RT (Stiegelis et al., 2004; León-Pizarro et al., 2007; Halkett et al., 2016).

Literature has also demonstrated that anxiety due to RT is ranked first among the factors influencing patients' adherence



to treatment (Dragomir and Fodoreanu, 2013; Ho et al., 2013; Hyphantis et al., 2013).

Voigtmann et al. have investigated anxiety in a cohort of 240 patients undergoing RT, and found that 28% of the patients scored in the pathological or borderline anxiety range (Voigtmann et al., 2010).

Nixon et al. have recently investigated the anxiety due to the immobilization mask used for RT in head and neck cancer patients and found that females were more likely to experience higher mask anxiety (Nixon et al., 2019). The population of the patients analyzed in our study show a big proportion of patients with brain cancer and head and neck cancer (123 pts, 26.8%), thus explaining the high anxiety levels in the study.

Marital status, conversely, is not correlated with the development of anxiety (Nieder and Kämpe, 2018), whereas Shimotsu et al. have classified specific types of anxiety, respectively due to adverse effects of RT, the environment of RT, and treatment effects of RT (Shimotsu et al., 2010).

In this regard, Mullaney et al. have correlated the department's psychosocial climate and treatment environment on patients' anxiety during radiotherapy, and found that both these aspects significantly impact anxiety levels (Mullaney et al., 2016).

The other parameters that are correlated with mood disorders are sex, week of treatment, and disease.

Female patients show more anxiety than male patients, in accordance with previous studies (Dunn et al., 2012). Increased anxiety levels in some specific diseases (head and neck cancer, brain cancer, and lung cancer) may be due to the more severe conditions and to the use of immobilization systems such as masks, as previously reported.

Finally, patients show increased anxiety at the beginning of the RT, whereas the anxiety levels tend to decrease in the following week. This trend is in line with the literature (Dunn et al., 2012).

## Limitations

This study must recognize several limitations. First of all, the study utilized a small group from a single institution. In addition, worries about identification and potential medical insights may have induced participants to score low on tests.

All cancer patients were tested before the COVID-19 outbreak to obtain basal values and to explore different strategies with the aim to improve radiation therapy workplace cultures, such as medical humanities programs and music therapy (Vinciguerra et al., 2019; Nardone et al., 2020).

The basal test has allowed a first and unprecedented measurement of the real effects of COVID-19 outbreak in cancer patients.

Finally, it is important to underline that this study was conducted after the peak period of the COVID-19 outbreak, at the end of April. Future research is required in different institutions at different time points. At the same time, it is pivotal to follow up with the analyzed population.

## CONCLUSIONS

Cancer patients have shown a significant increase in anxiety and depression due to the COVID-19 outbreak.

Multi-institutional prospective evaluation is needed to confirm these data and to develop proper strategies in order to mitigate the increase.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Institutional Ethics Committee of Asl Napoli 1 (Naples, Italy). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

VN, CV, MGC, SF, and RG contributed to conception and design of the study. VN, PC, AD, and MP organized the database and performed the statistical analysis. VN, MC, SC, and CG wrote the first draft of the manuscript. CV, MGC, SF, and RG wrote sections of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.

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# The Importance of Well-Being on Resiliency of Filipino Adults During the COVID-19 Enhanced Community Quarantine: A Necessary Condition Analysis

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Nation-wide community quarantines and social distancing are part of the new normal because of the global COVID-19 pandemic. Since extensive and prolonged lockdowns are relatively novel experiences, not much is known about the well-being of individuals in such extreme situations. This research effort investigated the relationship between well-being elements and resiliency of 533 Filipino adults who were placed under the nationwide enhanced community quarantine (ECQ) during the COVID-19 pandemic. Participants comprised of 376 females (70.56%) and 157 males (29.45%). The median and mode ages of the participants is 23 years, while 25 is the mean age. PERMA Profiler was used to measure participants' well-being elements, while Connor-Davidson Resiliency Scale-10 (CD-RISC-10) was used to measure their resiliency. Collected data were analyzed using the regression model and necessary condition analysis. This study corroborated that all the five pillars of well-being are significant positive correlates of resiliency ( $p < 0.00$ ) in quarantined adults. The results shown accomplishment ( $\beta = 0.447$ ,  $p < 0.01$ ) positively predicts resiliency, while negative emotions ( $\beta = -0.171$ ,  $p < 0.00$ ) negatively predict resiliency. Lastly, the five pillars of well-being are necessary-but-not-sufficient conditions (ceiling envelopment with free disposal hull, CE-FDH  $p < 0.00$ ) of resiliency. Our results cast a new light on well-being elements as constraints rather than enablers of resiliency. This novel result shows that optimum resiliency is only possible when all the five pillars of well-being are taken care of and when a person is at least minimally contented with their physical health. The present findings underscore the importance of a holistic as against an atomistic approach to maintaining good mental health, which suggests that deficiencies in certain areas of well-being may not be fully addressed by overcompensating on other areas, as all five pillars of well-being are necessary-but-not-sufficient conditions of resiliency. The study ends with the recommendation for the use of necessary condition analysis to study both classical and novel psychological research problems.

**Keywords:** positive psychology, well-being, resilience, PERMA, COVID-19, necessary conditions and sufficient conditions for optimality, necessary condition analysis, Philippines

## THE IMPORTANCE OF WELL-BEING ON RESILIENCY OF FILIPINO ADULTS DURING THE COVID-19 WHO ARE COMMUNITY QUARANTINED

The infectious Coronavirus disease (COVID-19), which causes respiratory illness includes flu-like symptoms such as cough, fever, and in more severe cases, breathing difficulties. COVID-19 is mainly spread through contact with an infected person who sneezes or coughs. It can be acquired when a person touches their eyes, nose, or mouth after touching objects or surfaces that have the virus on it (World Health Organization, 2020). Starting December 2019, countries imposed travel bans and asked individuals who have possibly been exposed to the contagion to isolate themselves in a dedicated quarantine facility or at home (Brooks et al., 2020) at an unprecedented scale. The Philippines reported its first case of COVID-19 on January 30, 2020. Since then, the number of reported cases exponentially increased by the day (ABS-CBN Investigative and Research Group, 2020). As of December 12, 2020, 447,039 infected cases were reported throughout the country. Of the total number of cases, 409,329 have recovered, and 8,709 have died (Department of Health, 2020).

As a response to the growing threat of the pandemic, the entire Luzon was placed under enhanced community quarantine (ECQ; Medialdea, 2020). Shortly, both Visayas and Mindanao followed suit. The said measure involves draconian restrictions: that include the establishment of checkpoints in most cities; the suspension of classes in all levels; the prohibition of mass gatherings; the temporary shutting down of non-essential businesses; the banning of public utilized utility vehicles; and the strict implementation of home isolation. Although it was initially planned to end on April 12, 2020 (Abueg, 2020), several subsequent recommendations both from the national and local governments extended the nationwide community quarantine until December 31, 2020 (CNN Philippines Staff, 2020). As the nation's Gross Domestic Product (GDP) shrank 16.5% in the second quarter of 2020, the Philippines officially entered recession as an effect of the extended quarantines (Agence France-Presse, 2020). While quarantine is often among the initial responses against an emerging infectious disease (Parmet and Sinha, 2020), it is often unpleasant for those who are required to submit to it and may lead to several harmful conditions for some persons (Hawryluck et al., 2004; Brooks et al., 2020). Hence, the psychological effects of quarantine have received considerable attention. Barbisch et al. (2015) reported that losing autonomy, isolation away from loved ones, uncertainty, and boredom could lead to adverse effects on an individual's well-being. Following the imposition of cordon sanitaire in previous outbreaks, substantial anger, anxiety and even an increase in suicide rates have been reported (Brooks et al., 2020). Similarly, the National Center for Mental Health (NCMH) in the Philippines reported that depression and other mental health issues were on the rise after imposing ECQ in different provinces in the country (Tenorio, 2020).

## WELL-BEING AND ITS ELEMENTS

It is important to note that while quarantines are often unpleasant, their effect on people diverge. While there are individuals who experience mental health issues, there are also those who are more resilient and can move on with their lives. This highlights the importance of studying not only how individuals suffer in light of community quarantines, but also how they cope, and even flourish in the face of such challenging times. Seligman (2011) argued that even in difficult situations, human beings are motivated to thrive and not just merely survive. According to Fredrickson and Losada (2005), flourishing means living "within an optimal range of human functioning, one that connotes goodness, generativity, growth, and resilience." Based on this definition, resilience appears to arise from flourishing. Well-being predicts resiliency. For clarity, the terms "flourishing," "thriving," and "well-being" are used interchangeably in the literature (Butler and Kern, 2016). Therefore, we also use the terms interchangeably here.

Well-being Theory of Seligman (2011) advocates that flourishing arises from five well-being pillars-Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment, hence PERMA. It is important to note that no single element defines well-being, but each contributes to it. Positive emotions include an extensive variety of feelings, which include excitement, satisfaction, pride, and awe. Previous reviews highlight the important role of these emotions in positive life outcomes (Butler and Kern, 2016). Engagement involves activities that stimulate and develop upon an individual's interests. Csikszentmihalyi (2009) argues that true engagement leads to a state of deep and effortless involvement where an individual is completely absorbed in an activity that often leads to a sense of joy and lucidity. Relationships are social connections important in stimulating positive emotions. They can either be work-related, familial, romantic, and even platonic. The experiences that contribute to well-being are often amplified through our relationships. Positive relationships have been linked to positive outcomes such as better physical health, healthier behaviors, less psychopathology, and lower mortality risk (Tay et al., 2013). A sense of meaning is derived from having a direction in life, belonging to a cause larger than the self, and serving a purpose greater than one's immediate needs (Steger, 2012). Such activities provide a sense that life is valuable and worthwhile. Various societal institutions such as religion, politics, justice, and community social causes enable a sense of meaning. Accomplishments are pursuits toward and reaching goals, mastery, and efficacy to complete tasks (Butler and Kern, 2016) in various domains such as the workplace, in sports and games, and even in hobbies and interests. Seligman (2011) argued that people pursue accomplishments even when they do not result in positive emotions, meaning, or relationships. Although PERMA was developed mainly within the Western context, several researches found that PERMA is experienced in culturally consistent manners in non-Western societies such as the United Arab Emirates (Lambert and Pasha-Zaidi, 2016), Hong-Kong (Lai et al., 2018), and the Philippines (Nebrida and Dullas, 2018).

## DEFINING RESILIENCE

Over the past decade, resilience has become a popular concept in both research and clinical practice (Kumpfer, 2002; Walsh-Dilley and Wolford, 2015). Despite the lack of consensus in how it is defined (Vella and Pai, 2019), it is accepted that resilience involves the positive adaptation following a stressful or adverse experience (Porterfield et al., 2010). Most definitions acknowledge two key points about resilience (Herrman et al., 2011). First, is that various factors interact with it. For example, personal characteristics such as personality traits (Oshio et al., 2018), self-esteem (Karatat and Cakar, 2011), and even age (Diehl and Hay, 2010) influence resilience. Social and community factors (Harms et al., 2018) such as secure attachments, the presence of a role model (Levine, 2003), family stability (Grubman, 2018), and culture (Ungar, 2008) affect the ability to cope with daily struggles. Second, resilience is time and context-specific and may not be present across all life domains. Resilience appears to be receptive to the influence of specific situations (Hayman et al., 2017) such as unique stressors (Jex et al., 2013) like war and other happenstances (Besser et al., 2014).

While the aforementioned literature provides key insights into the definition, factors, and contexts of resilience, most research focuses on factors are outside the control of the individual. While these researches are important in explaining the development of resilience, they lack emphasis on positive mechanisms, which are behaviors a person can perform to facilitate resilience. While resilience has been studied both in daily and unique stressors, none focused on the novel situation of wide range community quarantines. Therefore, despite the abundance of resilience-related research, the question remains “What positive mechanisms are involved in the resilience of people who are subjected to quarantine?”

## THE PRESENT STUDY

In this paper, we introduced a novel approach in understanding the necessary but not sufficient nature of the aforementioned positive aspects of well-being in predicting resiliency. We used Dul (2016) Necessary Condition Analysis (NCA), which seeks to identify necessary-but-not-sufficient conditions in data sets (Dul, 2018). A necessary condition is a crucial factor in an outcome. If it is not in place, the outcome will not be achieved, but its sole presence does not guarantee that the outcome will be obtained. Without the necessary condition, however, there is a certain failure, which may not be compensated by other determinants of the outcome. Necessary (but not sufficient) conditions widely exist in real-life. For example, the novel SARS-CoV-2 coronavirus is a necessary-but-not-sufficient condition for COVID-19 (World Health Organization, 2020). Without SARS-CoV-2 coronavirus, an individual will not acquire COVID-19. However, even with SARS-CoV-2 coronavirus, an individual may or may not acquire COVID-19. In the same light, a college student who wants to pass the course, Introduction to Psychology (the outcome) needs to attend 80% of lecture hours (necessary conditions). However, attending class regularly does not guarantee

passing the course as other requirements (examinations, seat-works, research work, and journal critique paper) play a role in a student's grade. Yet, if the student incurs too many absences and tardiness, failure is guaranteed. As seen in the aforementioned examples, necessary causes are not automatically sufficient. They can be seen as constraints, barriers, or obstacles one needs to deal with to arrive at the desired outcome.

While well-being and resiliency are closely related concepts (Hu et al., 2015) *Flourishing* model of Seligman's (2011) perceives resiliency as the result of both “surviving” and “thriving” psychological characteristics. This theoretical relationship between well-being and resilience has gained empirical support in recent years (Harms et al., 2018). For example, Martínez-Martí and Ruch (2017) and Burns and Anstey (2010) demonstrated that measures of well-being are not simply redundant with self-report scales of resilience. At the same time, while the relationship between these two concepts are robust, it is rarely straightforward (Harms et al., 2018). Interestingly, some researchers (Fredrickson et al., 2003; Tugade and Fredrickson, 2004; Ong et al., 2006, 2010; Kuntz et al., 2016) argued that optimal levels of PERMA elements predict resilience in normal sample.

In the light of the foregoing, the present study aims to investigate how PERMA predicts the resiliency of community quarantined individuals. An explanation of possible necessary-but-not-sufficient conditions of resiliency during quarantine may have both theoretical and practical value. Theoretically, an investigation of this sort allows the advancement of our understanding of how a multitude of variables coalesces to produce resiliency in times of quarantine and social isolation. This is significant as wide-range and prolonged quarantines are relatively novel experiences. Hence, not much is known about its psychological implications for human beings. Psychological interventions may target different necessary-but-not-sufficient variables jointly. Because of NCA's ability to identify *bottleneck* variables (Dul, 2019a), conditions that must be present for resiliency to be possible, interventions may prioritize bottleneck variables of resiliency to maximize the use of limited resources. Lastly, identifying necessary-but-not-sufficient conditions for resiliency may also help individuals who are quarantined to develop their understanding of the behaviors they need to engage to have resiliency. Following this logic, we hypothesize that:

*H<sub>01</sub>*: PERMA elements predict the resiliency of the community-quarantined individuals.

*H<sub>02</sub>*: PERMA elements are necessary, but not sufficient conditions, for the resiliency of the community-quarantined individuals.

## METHODOLOGY

### Research Design

To test the assumption that PERMA elements are both sufficient and necessary conditions of resiliency in community quarantined individuals, sufficiency and necessity observational design were used concurrently. In these designs, the conditions (PERMA)

and the outcome (resiliency) are observed in real-life context and without the manipulation of the condition. While sufficiency and necessity observational research designs follow the same data gathering procedures, they diverge in data analysis. Dul (2016) argued that NCA is a complement to traditional approaches to analyze relations. As in our research, by using multiple regression we could spot determinants that contribute to resiliency, whereas NCA allowed us to spot critical determinants (constraints) that prevent resiliency from developing. These bottlenecks, when present, prevents resiliency from occurring even when we increase the values of other determinants unless we take away the bottlenecks by increasing the value of the critical determinant. NCA lead us to discover critical determinants that were not part of the determinants identified with the regression model. Using both approaches is critical in adequately understanding the resiliency of individuals who are subjected to the extended ECQ.

## Research Participants

Because of the restrictions in both mobility and social interactions as direct consequences of the nationwide ECQ, we used purposive – convenience sampling to recruit Filipino Facebook users who reside in communities placed under the ECQ. The survey was promoted through social media, primarily on Facebook. A total of 541 participants responded to our online survey *via* Google Form. The minimum age reported was 16 years old, while the maximum age was 64 years old with a median of 23. Because resiliency scores are contingent to age, only those whose ages ranged between emerging adulthood to early middle adulthood (18–40) were included in the study.

## Inclusion Criteria

Participants that were considered to partake in the research met the following criteria: first, a participant must be aged 18 to 40 years old. Second, he/she resides in a quarantined area in the Philippines. Third, a participant must be a Filipino citizen as social and cultural factors influence resiliency.

## Exclusion Criteria

A participant was excluded in the research because of the following conditions: first, a participant aged less than 18 years old and over 40 years old, a participant who refused to completely answer the online survey questionnaires, and a participant who does not reside in a quarantine area in the Philippines.

## Ethical Considerations

In dealing with the participants, respect and protection of the privacy of the participants were prioritized. Thus, privacy and anonymity was of paramount importance. Also, voluntary participation of the chosen participants for said the study was important. Participants had the right to withdraw from the study at any phase of the research if they wished to do so.

Potential participants were fully informed regarding the research, full consent was essential and obtained from the participants. The first page of the online questionnaire required

participants to check a box to show consent before having access to the survey. The principle of informed consent involved the researchers providing sufficient information and assurances about taking part to allow potential participants to understand the implications of participation and to reach a fully informed, considered, and freely decided about whether to do so, without the exercise of any pressure or coercion. No incentives were provided in return for their participation.

In collecting data through online surveys, we minimized intrusions on privacy, anonymity, and confidentiality. Before data collection, an adequate level of confidentiality of the research data was ensured to the participants to make them feel secured and protected with the information they shared or contributed. Also, any communication about the research was observed with respect and transparency. Ultimately, research participants are not subjected to harm.

## Research Instruments

Google Forms was used to gather sociodemographic variables from the sample and deliver the following self-administered scales, which were used to measure the variables of the current study. Specifically, we used the Connor-Davidson Resiliency Scale-10 (CD-RISC-10) to measure their resiliency, and the PERMA Profiler to measure participants' well-being elements.

## Connor-Davidson Resiliency Scale

The CD-RISC-10 is a 10 item scale that is used to measure resiliency, operationally defined as the ability to “thrive in the face of adversity” (Connor and Davidson, 2003). The unidimensional CD-RISC-10 evaluates several components of psychological pliability: the abilities to adapt to change, manage what comes along, handle stress, stay focused and think clearly, avoid getting discouraged in the face of failure, and handle unpleasant emotions such as pain, sadness, and anger (Campbell-Sills and Stein, 2007). Each item is rated on a five-point range of responses. The total score is computed by getting the sum of all the responses whereby higher scores show high resilience (Scali et al., 2012). Campbell-Sills et al. (2009) maintained that CD-RISC-10 has a median score of 32 with lowest to highest quartiles of 0–29 (Q1), 30–32 (Q2), 33–36 (Q3), and 37–40 (Q4) in general sample. As a widely used scale, CD-RISC-10 has achieved remarkable internal consistency of 0.89 in general population samples. It is both valid and reliable within the context of different cultures, including Filipino samples (Campbell-Sills and Stein, 2007).

## PERMA Profiler

The PERMA Profiler is a brief scale that measures the five pillars of well-being: positive emotion, engagement, positive relationships, meaning, and accomplishment, together with negative emotions and health (Butler and Kern, 2016) along a 10-point Likert type scale. Of the 23 items, 15 correspond to the five core elements of well-being (three items per PERMA domain). In addition, eight items were included to test negative emotions (three items), physical health (three items), loneliness (one item), and overall well-being (one item). All items are



expressed positively and higher scores denote better well-being except for negative emotions. Subscale scores are calculated by getting the mean of the three items on each subscale, except for loneliness. Overall well-being is calculated by averaging all items except those from the negative emotions subscale. The measure has been used in various samples and was found to have sufficient psychometric properties (Cobo-Rendón et al., 2020). Butler and Kern (2016) reported that adequate reliability is observed for overall well-being and all subscales,  $\alpha$  range from 0.71 to 0.94 across eight studies ( $N = 31,966$ ). According to Nebrida and Dullas (2018), the Tagalog version of the PERMA Profiler has a Cronbach's alpha of 0.842 in 101 Filipino participants.

In the current study ( $n = 533$ ), both PERMA Profiler ( $\alpha = 0.927$ ) and CD-RISC-10 ( $\alpha = 0.915$ ) have an "excellent" internal consistency. These results confirm that the scales are reliable tools for measuring elements of Well-being and Resiliency, respectively, in our sample.

## Data Gathering Procedures

Data gathering lasted from March 23 to April 10, 2020, during the first reset of the nationwide extended ECQ. After securing individuals' interest to take part in the study, we sent potential participants a link to the survey *via* Facebook Messenger. The first section of the Google Form shows the title of the research and an overview of the current study. After giving consent, participants could fill out the survey. Participants cannot answer the scales without explicitly agreeing to partake in the study. After securing informed consent, each participant was asked to provide their sociodemographic characteristics and then answer the PERMA Profiler and the CD-RISC-10. Answering both scales did not take the participants more than 20 min. After completing the questionnaire, each participant was virtually debriefed.

At any point, should a participant decide not to proceed with the research, they were free to do so with no implications. All the participant has to do was to close the Google Form window and any previously provided data were not recorded.

Data from Google Form were exported to IBM's Statistical Package for Social Sciences (SPSS) and NCA Software for data analysis.

## Data Analysis

Frequency and percentage were used to analyze the sociodemographic characteristics of the participants. We used Cronbach's alpha to determine the internal reliability of the measuring scales. Correlation and multiple regression analyses were conducted to examine the relationship between PERMA elements and potential predictors of resiliency. Lastly, we used NCA to analyze whether the core elements of well-being are necessary but not sufficient conditions of resiliency.

There are two steps in NCA (Dul et al., 2019), determining ceiling lines and bottleneck tables are the first. Unlike traditional regression models where a line is drawn through the middle of the data in an XY-plot, a ceiling line is created in NCA. This line distinguishes between areas with cases and areas

without cases, the zone found in the upper left-hand corner of the plot. However, exceptions such as outliers and errors may be present in a sample so that the empty zone above the ceiling is not empty (Karwowski et al., 2016). The ceiling line is a non-decreasing line (either a linear step function or a straight line) that shows which level of  $x$  (well-being elements) is necessary but not sufficient in producing the desired level of  $y$  (resiliency).

Dul (2016) identified two techniques in drawing the ceiling line. The first is the non-parametric Ceiling Envelopment with Free Disposal Hull (CE-FDH), which is a piecewise linear line. It is the default ceiling envelopment technique for NCA because it is flexible and intuitive and applies to dichotomous, discrete, and continuous conditions. The second technique is the parametric Ceiling Regression with Free Disposal Hull (CR-FDH), unlike the CE-FDH, this technique smoothens the piecewise linear lines by using a straight line. Because of this, CR-FDH usually has some observations above the ceiling line. Whereas CE-FDH does not. In further comparing the two techniques, CE-FDH is preferred when a straight line does not represent the data because smoothing reduces the size of the ceiling zone as with dichotomous variables and for discrete and continuous variables with relatively low small data sets. CE-FDH is 100% accurate in drawing the demarcation between observations above and observations below the ceiling line.

Quantifying the accuracy of ceiling lines, effect size, and statistical significance of the necessary conditions and necessary inefficiency are the second and final step (Dul et al., 2020). The area of the empty zone above the ceiling line divided by the area where cases would be possible given the minimum and maximum values of  $X$  and  $Y$  is the effect size of a necessary condition (Karwowski et al., 2016). Therefore, large effect size shows lower ceiling line and greater limitations that well-being elements have on resiliency. On the other hand, if there is a lack of empty space in the scatter plot then well-being elements are not contingents of resiliency. The effect size of a necessary condition can take the values between 0 and 1 where 0–0.1 corresponds to a small effect, 0.1–0.3 a medium effect, 0.3–0.5 a large effect, and  $d$  that is greater than 0.5 a very large effect (Tynan et al., 2020). An R package that allows the calculation of various effect size indicators and inferential statistics useful for hypothesis testing is provided by Dul (2016). The NCA null hypothesis is that the observed effect size is the same as the effect size calculated using random data (Dul, 2019b). An estimation of the probability that the observed necessary condition effect size results from comparing two unrelated variables, otherwise known as permutation test, is used to determine statistical significance in NCA (Dul et al., 2020). Observed values of the  $x$  and  $y$  variables are randomly paired without replacement. Such pairing continues until the sample size is reached and the process is repeated at least 10,000. The resultant value of  $p$  is interpreted using traditional thresholds such as  $\alpha = 0.05$  or  $\alpha = 0.01$ . Depending on the context of the research, both significance testing and effect size are useful in determining the theoretical and practical importance of an observed outcome (Tynan et al., 2020). We focus our attention on conditions with both  $d > 0.5$  and  $p < 0.05$ .

SPSS was used to analyze the frequency and percentage of various sociodemographic variables, the scales' reliability, and for generating the Regression Model. R Statistical Software with NCA Package was used to conduct NCA.

## RESULTS

### Profile of the Participants

Participants comprised 376 females (70.56%) and 157 males (29.45%). The median and mode ages of the participants are 23 years, while the mean age is 25. Among the participants 189 (35.46%) were college students, 293 (54.97%) are employed, and 51 (9.57%) are out of work. Lastly, seven (1.31%) participants reported that they had direct contact with someone who was infected with COVID-19, while 100 (18.76%) reside in communities with known COVID-19 cases and 426 (79.92%) have no exposure to the disease.

### PERMA as Predictors of Resiliency

**Table 1** summarizes the descriptive statistics and analysis results of the study. Results revealed that the mean resiliency score of the participants is 24.83, with a SD of 7.22. PERMA elements including overall well-being are positive and significantly correlated with resiliency. Interestingly, a subjective sense of health (feeling good and healthy each day) showed only a weak, albeit significant positive correlation with resiliency. Negative emotions and loneliness are negatively correlated with resiliency.

The multiple regression model with all nine predictors produced  $R^2 = 0.368$ ,  $F(9, 523) = 33.83$ ,  $p < 0.001$  with adjusted  $R^2 = 0.357$ . This means that 36.8% of the variance in resiliency scores is because of the PERMA elements. As seen in **Table 1**, accomplishment ( $\beta = 0.447$ ,  $p < 0.01$ ) and negative emotions ( $\beta = -0.171$ ,  $p < 0.00$ ) are the only elements of PERMA with significant regression weights, showing scores on these elements predict resiliency. However, negative emotions have significant negative weight as compared to with standardized coefficients of  $-0.171$  vs.  $0.477$ .

**TABLE 1 |** Summary statistics, correlations, and coefficient results for regression analysis of study variables.

Variables	Mean	SD	R	Rp	$\beta$	B	p
Resiliency	24.83	7.22					
Positive Emotions	7.13	2.03	0.54	0.00	0.271	0.963	0.25
Engagement	7.36	1.85	0.40	0.00	0.142	0.556	0.44
Positive Relations	7.31	2.06	0.46	0.00	0.126	0.440	0.57
Meaning	7.27	2.10	0.53	0.00	0.239	0.820	0.29
Accomplishment	7.04	1.86	0.55	0.00	0.447	1.85	0.01
Overall Well-being	7.27	1.55	0.57	0.00	-0.583	-2.72	0.54
Health	7.41	1.58	0.261	0.00	0.143	0.66	0.42
Negative Emotions	5.62	2.17	-0.03	0.516	-0.171	-0.57	0.00
Loneliness	5.23	2.87	-0.07	0.96	-0.028	0.573	0.57

R, Pearson correlation coefficient with resiliency; Rp, p value of R; Loneliness and health  $R = -0.211$ , where  $p = 0.001$ .  $\beta$ , standardized beta; B, unstandardized beta; p, probability value of PERMA elements as predictors of resiliency.  $R^2$  of five original PERMA elements including four additional subscales = 0.368.

The multiple regression model of the four confounders between the relationship of PERMA elements and resiliency produced  $R^2 = 0.036$ ,  $F(4, 528) = 4.90$ ,  $p < 0.001$  with adjusted  $R^2 = 0.028$ . It shows that the spread of the confounders is 3.6% between the relationship of the variables. As seen in **Table 2**, only employment status (student, unemployed, and employed) with  $\beta = 0.14$ ,  $p < 0.00$  is a significant predictor of resiliency.

### PERMA as Necessary-But-Not-Sufficient Conditions of Resiliency

The results of NCA on Resiliency show that all five elements of the original Seligman (2011) PERMA are necessary but not sufficient conditions of Resiliency among individuals who are community quarantined as showed by the size of the empty zone in the XY-plots in **Figure 1**. This means that to score 35 in the CD-RISC-10, a score of 1 for positive emotions and engagement, a score of 2 for Positive Relationships, Meaning, and Accomplishment are necessary.

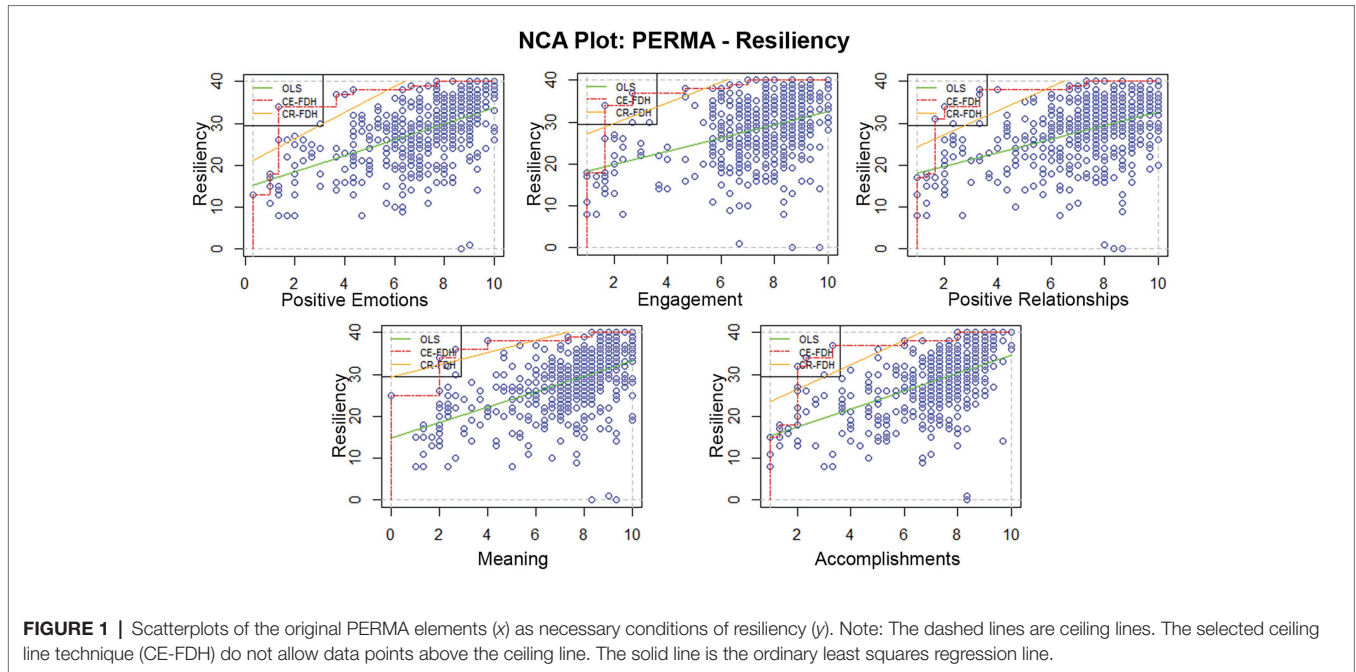
**Figure 2** contains the scatterplots of the four supplementary subscales of Butler and Kern (2016) PERMA Profiler. Only the xy-plot of Overall Well-being (x) and Resiliency (y) has a “moderately sized” empty zone in the upper left corner of the plot. This is not surprising considering that Overall Well-being is the composite score of the five PERMA elements and health score. The scatterplots of Health (x) and Resiliency (y), and Negative Emotions (x) and Resiliency (y) contain discernibly small empty zones. Lastly, the empty zone is absent in the Loneliness (x) – Resiliency (y) scatterplot. This assumes that Loneliness is not a necessary condition of Resiliency as the presence and size of an empty zone is a sign that a necessary condition is present (Dul, 2016).

We summarized the results of the multiple NCA in **Table 3**. The observed accuracy of all variables exceeds arbitrary benchmark of Dul (2018) for the desired accuracy of 95%. Dul suggests the use of CR-FDH for interpreting variables with accuracies above 95%. However, since our variables do not follow a normal distribution ( $p = 0.00$ ) based on One-Sample Kolmogorov-Smirnov Test, we used the non-parametric CE-FDH ceiling line technique. Necessary-but-not-sufficient relationships between Resiliency and the five original PERMA elements and the auxiliary components are observed. The NCA effect size range between  $d = 0.09$  and  $0.12$  based on CE-FDH for the original PERMA elements and  $d = 0.04$  to  $0.12$  on the supplementary elements, excluding Loneliness. According to recommendations, Positive Emotions, Meaning, Accomplishment, and Overall Well-being of Dul (2016) have medium effect

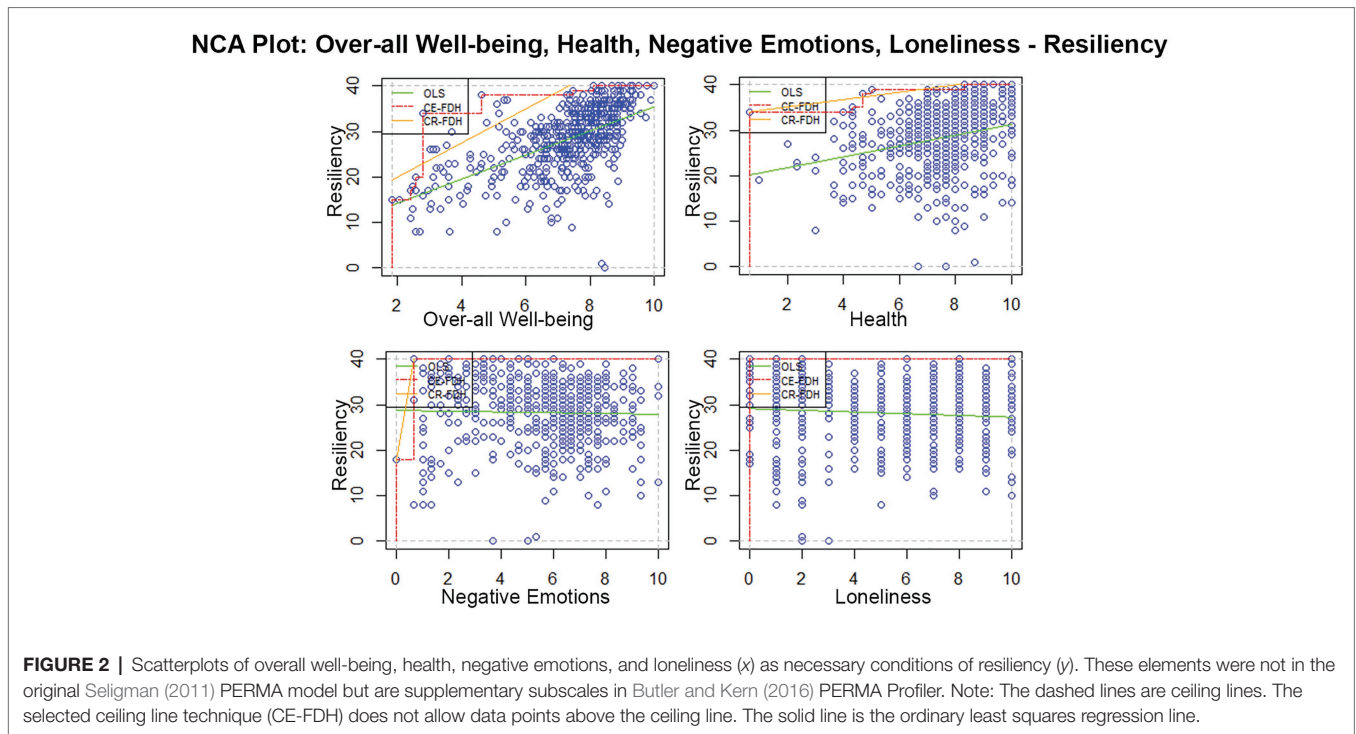
**TABLE 2 |** Confounders between the relationship of PERMA and Resiliency.

Variables	R	$\beta$	B	p
Resiliency				
Gender	0.01	0.02	0.24	0.73
Age	0.14	0.08	0.09	0.08
Exposure to COVID-19	0.01	0.00	0.06	0.93
Employment status	0.17	0.14	1.09	0.00

R, Pearson correlation coefficient with resiliency;  $\beta$ , standardized beta; B, unstandardized beta; p, probability value of confounders with  $p < 0.001$ .



**FIGURE 1 |** Scatterplots of the original PERMA elements (*x*) as necessary conditions of resiliency (*y*). Note: The dashed lines are ceiling lines. The selected ceiling line technique (CE-FDH) do not allow data points above the ceiling line. The solid line is the ordinary least squares regression line.



**FIGURE 2 |** Scatterplots of overall well-being, health, negative emotions, and loneliness (*x*) as necessary conditions of resiliency (*y*). These elements were not in the original Seligman (2011) PERMA model but are supplementary subscales in Butler and Kern (2016) PERMA Profiler. Note: The dashed lines are ceiling lines. The selected ceiling line technique (CE-FDH) does not allow data points above the ceiling line. The solid line is the ordinary least squares regression line.

sizes on Resiliency. Engagement, Positive Relationships, Negative Emotions, and Health have small effect sizes on Resiliency. The NCA significance test is powerful enough to rule out an effect being the product of randomness (Dul et al., 2020). Lastly, there is no necessary-but-not-sufficient relationship between Loneliness and Resiliency.

The ability to identify bottleneck variables (constraints) is a useful feature of NCA, especially for interpreting

multivariate necessary conditions (Dul, 2019b). **Table 4**, which is read horizontally, shows for which level of resiliency, which level of PERMA elements is necessary. For a desired value of resiliency, in the first column, it shows the minimum required values of the PERMA elements in the next columns. Levels are expressed in percentage ranges so that 0 is the minimum value, the maximum is 100, and 50 is the point between these two values.



**TABLE 3 |** Necessary conditions effect size and significance test for PERMA Profiler subscales predicting Connor-Davidson Resiliency Scale-10 (CD-RISC-10) scores.

	CE-FDH	CE-FDH <sub>p</sub>	CR-FDH	CR-FDH <sub>p</sub>	Accuracy (%)	Skewness	Skewness p
Positive Emotions	0.12	0.001	0.15	0.001	98.5	-1.18	0.00
Engagement	0.09	0.001	0.09	0.001	99.4	-1.56	0.00
Positive Relations	0.09	0.001	0.12	0.001	98.9	-1.19	0.00
Meaning	0.12	0.008	0.10	0.008	99.4	-1.21	0.00
Accomplishment	0.12	0.001	0.13	0.001	98.7	-1.37	0.00
Overall Well-being	0.12	0.001	0.17	0.001	97.7	-1.32	0.00
Health	0.07	0.21	0.06	0.27	99.4	-0.45	0.00
Negative Emotions	0.04	0.23	0.02	0.52	100	-0.81	0.00
Loneliness	0.00	1.00	0.00	1.00	100	-0.23	0.00

CE-FDH, ceiling envelopment with free disposal hull; CR-FDH, ceiling regression with free disposal hull. The p value reported was estimated with 10,000 permutations and are treated as significant if <0.05. The threshold for statistical significance is arbitrary but commensurate with the example given by Dul et al. (2020). Accuracy refers to the percentage of observations under the CR-FDH ceiling line. Skewness p is based on One-Sample Kolmogorov-Smirnov Test. Skewness of resiliency scores is -0.78.

**TABLE 4 |** Bottleneck table of PERMA elements as necessary conditions of resiliency based on CE-FDH.

Re	P	E	R	M	A	OW	H	N	L
0	NN	NN	NN	NN	NN	NN	NN	NN	NN
10	NN	NN	NN	NN	NN	NN	NN	NN	NN
20	NN	NN	NN	NN	NN	NN	NN	NN	NN
30	NN	NN	NN	NN	NN	NN	NN	NN	NN
40	6.9	NN	NN	NN	3.7	7.1	NN	NN	NN
50	10.3	7.4	7.4	NN	11.1	9.1	6.7	NN	NN
60	10.3	7.4	7.4	NN	11.1	11.6	6.7	NN	NN
70	10.3	7.4	7.4	20.0	11.1	11.6	6.7	NN	NN
80	10.3	7.4	11.1	20.0	11.1	11.6	6.7	NN	NN
90	34.5	18.6	25.9	26.7	25.9	34.2	6.7	42.9	NN
100	75.9	66.7	70.3	83.3	77.8	76.8	6.7	82.1	NN

Re, resiliency; P, positive emotions, E, engagement; R, positive relationships; M, meaning; A, accomplishment; OW, overall well-being; H, health; N, negative emotions; L, loneliness; NN, not necessary.

The bottleneck table shows that no minimum value of any PERMA element is necessary to score 30% in Resiliency. This means that at 30% no PERMA element is a bottleneck for resiliency. However, for a resiliency level of 40%, the minimum required level of Positive Emotions is 6.9%, the necessary level of Accomplishment is 3.7, 7.1% for Overall Well-being, and none of the over PERMA elements are necessary. As observed in the bottleneck table, when Resiliency increases from 0 to 100%, more PERMA elements become necessary, and required levels of the PERMA elements become higher. At 90% level of Resiliency, the necessary level of Positive Emotions is 34.5%, Engagement is 18.6%, Positive Relationships is 25.9%, Meaning is 26.7%, Accomplishment is 25.9%, Overall Well-being is 34.2%, Health is 6.7%, and Negative Emotions is 42.9%. No level of Loneliness is necessary for any level of Resiliency. Not achieving any of these minimum levels means that attaining a 90% level in resiliency is impossible. Since each condition is a bottleneck, scoring higher in other elements does not compensate for the deficiency in others.

## DISCUSSION

Wide range community quarantines and social distancing are elements that are increasingly becoming the new normal as

a result of the global COVID-19 pandemic. Previous research (Hawryluck et al., 2004; Barbisch et al., 2015; Brooks et al., 2020; Parmet and Sinha, 2020) offer invaluable insights into the psychological consequences of restrictions. Moreover, while there has been an interest in the psychological impact of COVID-19 and community quarantine in the Philippines (for example, Nicomedes and Avila, 2020; Tee et al., 2020), most focus on the negative psychological impact of COVID-19. This raises the question of what protective factors are important in the midst of prolonged community quarantines. To test this properly, we used a combination of the traditional regression model and the novel multivariate necessary-but-not-sufficient conditions analysis to investigate how resiliency is contingent on well-being elements in Filipinos who are community quarantined.

Participants of this study were predominantly female, around the age of 23 and who are employed. While, we specifically targeted individuals between the ages of 18–40, most of our sample are emergent adults (mean age = 25, median, and mode ages = 23). The disproportional representation of young adult females can be attributed to several factors. First, previous studies (Smith, 2008; Yetter and Capaccioli, 2010; Slauson-Blevins and Johnson, 2016) have reported that young adult females take part in online surveys at a higher frequency compared with their male counterparts. There are more female Facebook users than males (Lee et al., 2016), which is significant because we invited potential participants through Facebook. Lastly, the Philippines has a young population. The median age in the Philippines is 25.7 (United Nations Statistics Division, 2019; Plecher, 2020). Taken together, it can be assumed that the sociodemographic characteristics of our study are similar to the Filipino Facebook population.

Based on the CD-RISC-10 quartiles for community sample provided by Campbell-Sills et al. (2009), the mean resilience score (24.83) of the current sample belongs to the lowest 25%. This implies that the participants of the current study have lower resiliency scores than the general population. This result ties well with the notion that resilience is stress-context specific (Jex et al., 2013; Wood and Bhatnagar, 2015; Hayman et al., 2017) and that the nature of the sample influences resiliency scores (Connor and Davidson, 2003). Specifically, people with psychiatric problems and those who are experiencing significant



stress score lower than the general population (Li et al., 2012; Ye et al., 2017). In the context of COVID-19, Nicomedes and Avila (2020) found that Filipinos in community quarantine experience significant stress and scored high on both health anxiety and panic.

While resiliency and well-being have become commonplace terms and construct central in positive psychology (Jeste et al., 2015), they are often studied using correlational methods (Schultze-Lutter et al., 2016), and traditional approaches *via* the sufficiency paradigm. In line with previous studies (Souri and Hasanirad, 2011; Khawaja et al., 2017; van Agteren et al., 2018), we found that all elements of well-being are positively correlated with resiliency. Although the multiple regression test shows that among the original PERMA elements, only accomplishment is a significant predictor of resilience. This means that the subjective sense of competence, having a structure each day, i.e., identifying, setting, and achieving daily goals enable resiliency in individuals subjected to quarantine. We also observed that negative emotions significantly, although negatively predict resilience. This suggests the significant predicting function of individuals' tendency to experience anxiety and anger for lower levels of resilience. These findings support the previously reported (Tugade and Fredrickson, 2004; Chen et al., 2018) link between negative emotions and low levels of resilience.

In this paper, we identified elements of well-being that are necessary-but-not-sufficient for resiliency to occur in individuals who are community quarantined. Specifically, Positive Emotions, Meaning, and Accomplishment are significant and moderately necessary conditions of Resiliency, as suggested by their medium effect size. This finding suggests that positive feelings like interest, joy, and contentment and pursuing a daily purpose, and regularly experiencing a sense of accomplishment are essential to quarantined individuals' ability to thrive in their present predicament. Such necessary conditions not only allow individuals to enjoy everyday experiences (Abiola et al., 2017) but also provide a sense that life matter, which replenishes depleted energy from adverse experiences, and are required in the development of resiliency.

Engagement and Positive Relationships have small yet significant effect sizes on Resiliency. This infers that experiencing a state of "flow," or being absorbed in an activity (Nakamura and Csikszentmihalyi, 2014) and feeling loved, supported, and valued by others are also necessary to the quarantined individuals' capacity to recover quickly from their daily difficulties. This ties well with previous studies (Eaude, 2009; Svence et al., 2015; Abiola et al., 2017; Gerino et al., 2017; Roncaglia, 2017; Cobo-Rendón et al., 2020), where well-being elements were observed to be related with the occurrence of resiliency in individuals from a different context. Well-being elements allow quarantined individuals to focus their attention on alleviating harm, preventing negative mental health consequences, and finding positive outcomes in the presence of difficulty.

A unique finding, we encountered is that PERMA elements are bottleneck variables of resiliency. This highlights the little-known capacity of well-being to serve as a constraint to attaining higher levels of resiliency in community-quarantined individuals. This novel result shows two things. First, low levels of resiliency

(30% and less) do not necessitate even the slightest well-being elements. Second, higher levels of resiliency require certain levels of all the original PERMA elements and physical health. However, health remains a constant, albeit weak, necessary condition. This means that optimum resiliency is only possible when all the five pillars of well-being are taken care of and when one is at least minimally content with their physical health. When comparing our results to those of older studies (Sanders et al., 2015; Svence et al., 2015; Abiola et al., 2017). It must be pointed out that while the link between well-being and resiliency has been suggested in these studies, none could establish the necessary-but-not-sufficient relationship between the concepts. The present findings underpin the importance of holistic rather than an atomistic approach to mental health as noted by Mario (2012) and contradicts the compensation hypothesis of well-being. NCA revealed that deficiencies in certain areas of well-being may not be addressed by overcompensating in other areas, as all five pillars of well-being are necessary-but-not-sufficient conditions of resiliency.

Our findings show that loneliness is inversely correlated with the subjective perception of health. This basic result is consistent with the research (Balter et al., 2019) showing that loneliness predicts poor immune systems in healthy young adults. This is important since maintaining good health is vital amidst a growing viral pandemic. We observed that loneliness is a significant negative predictor of resiliency and not a necessary condition for any level of resiliency in individuals who are community quarantined. A similar conclusion was reached by Perron et al. (2014) where individuals who feel resilient also experience less loneliness. This further highlights the importance of the elements of well-being as necessary conditions of resiliency, which may lessen the effects of or serve as a buffer against loneliness and other negative psychological consequences of quarantine.

The overall results of our study have theoretical and practical implications. At a theoretical level, our results found clear support to PERMA concept of Seligman (2011) as necessary ingredients of resiliency even for socially isolated individuals such as those placed in ECQ. This goes beyond previous reports wherein PERMA elements were observed as predictors of resiliency, as only NCA can identify a necessary-but-not-sufficient relationship between the said variables. Despite experiencing segregation like lockdowns, the conditions that will allow people to thrive in the face of adversity are the same as when they are not undergoing such a predicament. Therefore, this finding can help us understand how the five elements of well-being constrain the negative psychological consequences of community quarantine by providing a buffer against these harms, reducing their effects, and promoting individual capacity to cope with such unsettling conditions. From this standpoint, we speculate that PERMA should be inversely correlated with negative indicators of mental health and correspondingly with other elements of positive psychological health, as noted by Hu et al. (2015). At a practical level, this opens an opportunity to develop evidence-based interventions such as telepsychology (Zhou et al., 2020) for quarantined individuals that help

clients understand behaviors they need to engage to have resiliency, and target multiple necessary-but-not-sufficient variables jointly, and not just focus on certain elements of well-being. This provides support for eclectic approaches to therapy especially the ones that incorporate positive psychology as Bolier et al. (2013) noted empirical support for the effectiveness of such interventions. Lastly, our findings agree with the call to a more inclusive psychology in the Philippines. This paradigm shift involves incorporating such approaches as critical (Paredes-Canilao et al., 2015) and positive (Datu et al., 2018) psychology to the prevailing traditional pathology-based perspective.

One fundamental limitation of this study is that the use of multiple regression and NCA cannot guarantee causality (Dul, 2016). While our data is consistent with the causal hypothesis, it is not evidence of a causal connection. Therefore, causal necessary-but-not-sufficient relations should not be inferred from our data. Another important caveat in interpreting our results is that we used the Facebook population as compared to the actual geographical population. It is not a perfect representative since Facebook users are usually younger females who have better educational attainment compared to the general population (Kosinski et al., 2015). Resiliency and well-being were measured during the ECQ, a far from normal situation. Therefore, although we took obligatory safety measures to increase the trustworthiness of the findings, we suggest that care be exercised when generalizing our findings into the general population and normal circumstances.

Many questions remain to be answered concerning the well-being of people who are community quarantined and the utility of NCA in psychological research. Further work is needed to identify the negative consequences of prolonged quarantine on individuals, especially those who have preexisting mental health problems and those who experience a disruption in access to their mental health-care providers. Moreover Odacı and Kalkan (2010) reported that internet use, specifically social media (Maglunog and Dy, 2019) exacerbates loneliness and that social media usage is expected to rise during the ECQ. Another important question, therefore, is how does the ongoing quarantine affects rates and levels of loneliness. Finally, while necessary conditions are traditionally studied using regression analysis in psychological research, NCA proved to be a more useful tool in understanding necessary-but-not-sufficient relationships because of its ability to

understand bottleneck variables. We, therefore, recommend the use of NCA in both classical and novel psychological research problems.

Resiliency grants us the capacity to flourish in the face of difficulty. For resiliency to result, the pillars of well-being are essential. Our research reveals, however, that well-being elements could be enablers or constraints. Accomplishment, for example, could predict resiliency. All pillars are necessary to attain it. Compensating in certain aspects cannot address the deficiency in others. Herein lies the importance and significance of holistic well-being. Those who can attain this are better equipped to thrive in the ECQ, a situation that affects the lives of so many Filipinos.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Manila Tytana Colleges Research Ethics Committee. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

DC wrote the introduction, results, and discussion and conducted the necessary condition analysis. LB wrote the methods, contributed in the results and discussion, and conducted the correlation analysis, regression analysis, and reliability check of the scales. All authors contributed to the article and approved the submitted version.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.558930/full#supplementary-material>

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# Coping Behaviors and Psychological Disturbances in Youth Affected by the COVID-19 Health Crisis

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The COVID-19 pandemic and the quarantine undergone by children in many countries is a stressful situation about which little is known to date. Children and adolescents' behaviors to cope with home confinement may be associated with their emotional welfare. The objectives of this study were: (1) to examine the coping strategies used out by children and adolescents during the COVID-19 health crisis, (2) to analyze the differences in these behaviors in three countries, and (3) to examine the relationship between different coping modalities and adaptation. Participants were 1,480 parents of children aged 3–18 years from three European countries ( $n_{\text{Spain}} = 431$ ,  $n_{\text{Italy}} = 712$ , and  $n_{\text{Portugal}} = 355$ ). The children's mean age was 9.15 years ( $SD = 4.27$ ). Parents completed an online survey providing information on symptoms and coping behaviors observed in their children. The most frequent coping strategies were accepting what is happening (58.9%), collaborating with quarantine social activities (e.g., drawings on the windows, supportive applauses) (35.9%), acting as if nothing is happening (35.5%), highlighting the advantages of being at home (35.1%), and not appearing to be worried about what is happening (30.1%). Compared to Italian and Spanish children, Portuguese children used a sense of humor more frequently when their parents talked about the situation. Acting as if nothing was happening, collaborating with social activities, and seeking comfort from others were more likely in Spanish children than in children from the other countries. Compared to Portuguese and Spanish children, Italian children did not seem worried about what was happening. Overall, an emotional-oriented coping style was directly correlated with a greater presence of anxious symptoms, as well as to mood, sleep, behavioral, and cognitive alterations. Task-oriented and avoidance-oriented styles were related to better psychological adaptation (considered a low presence of psychological symptoms). Results also show that unaffected children or children with a lower level of impact were more likely to use strategies based on a positive focus on the situation. This study provides interesting data on the strategies to be promoted by parents to cope with the COVID-19 health crisis in children.

**Keywords:** quarantine, COVID-19, coping, stress, youth

## INTRODUCTION

In the first quarter of 2020, a serious public health crisis emerged worldwide due to the spread of the severe acute respiratory syndrome coronavirus (SARS-CoV-2) or COVID-19 (World Health Organization (WHO), 2020). To control the spread of the coronavirus, measures to reduce social contact were implemented in many countries, varying from only social limitation to voluntary or mandatory confinement. Spain and Italy, with, respectively, more than 28,700 and 32,700 deaths as of May 25 (European Centre for Disease Prevention Control, 2020) were among the most affected countries worldwide. Other countries such as Portugal managed to reduce the impact in the number of infections and deaths, reaching a comparatively low figure of 1,316 deaths on the same date. It is paradoxical that, in Portugal, confinement was voluntary, whereas, in Italy and Spain, where infections and deaths were much higher, mandatory confinement was imposed.

Although there is a history of epidemics in the past, this is the first time in our recent history that confinement has been imposed to control a pandemic. However, few available studies confirm the psychological impact of confinement due to COVID-19 on children and adolescents. In a sample of 2,330 school-age children in Hubei province, China, 23% reported depressive symptoms and 19% reported anxiety symptoms after 34 days of confinement, a higher prevalence than that found in previous studies (Xie et al., 2020). Orgilés et al. (2020), in a sample of 1,143 parents of Italian and Spanish children aged 3–18 years, found that 86% of them observed changes in their children's emotional or behavioral state compared to before the quarantine. When comparing the impact of confinement on the young population of Italy, Spain, and Portugal in a study that involved parents of 1,480 children and adolescents aged 3–18 years, Francisco et al. (2020) concluded that children from Italy were less affected than those from Spain, but also surprisingly less affected than children from Portugal, the country where the rules for confinement had been less restrictive. The authors conclude that, although Portuguese children could go outdoors and enjoyed a more normalized life, observing different behavior patterns in each family could be confusing and worrisome for them. Italian children, with mandatory confinement but allowed to go outdoors (a short walk with one adult near their home), were better adapted than Spanish and Portuguese children.

Confinement has brought about a major change in the lives of children and adolescents. School closure has changed their academic routines, social distancing has limited their social relationships with their family members, and the closing of the public spaces has modified their leisure, restricting it to their home. During any confinement, there are numerous stressors. Brooks et al. (2020), through a review of 24 studies, highlight that the main stressors of confinement are long duration, fear of infection, frustration and boredom, and the lack of adequate information from health authorities. However, the effect of the stressors of a confinement situation on people's well-being could depend on how they cope with the situation.

Coping behaviors can be defined as intentional and conscious responses to the demands and emotions of stressful events

(Lazarus, 1999; Compas et al., 2001). One of the most widely accepted classifications of coping behaviors is that of Lazarus and Folkman (1984), who distinguished between problem-focused and emotion-focused coping, as responses aimed at managing the problem that causes discomfort, and as regulating emotional responses to the problem, respectively. Subsequently, Parker and Endler (1992) observed that problem-focused coping strategies were associated with task orientation, whereas emotion-focused coping reflected an individual-focused orientation (Stanislawski, 2019). They included a third dimension called avoidance-oriented coping, which involved both task-focused and individual-focused strategies. The former is conceived as distraction (performing alternative tasks as a coping strategy), whereas the latter implies social amusement (instead of confronting the stressful situation). The ability to cope with stressful events and regulate emotions can play an important role in the explanation of why some children develop psychopathological symptoms while others not (Compas et al., 2017).

There is extensive literature on the behaviors that children and adolescents carry out to face stressful situations. Identifying coping behaviors in stressful situations can facilitate early effective interventions to reduce the risk of future psychological problems. Numerous studies have examined how certain coping behaviors can help to reduce stress whereas others have been associated with negative psychological symptoms. Specifically, coping behaviors of children and adolescents suffering from chronic diseases (e.g., Compas et al., 2012; Jaser et al., 2017), sexual abuse or mistreatment (e.g., Bal et al., 2009; Flett et al., 2012), war or post-war situations (e.g., Benson et al., 2011; Braun-Lewensohn et al., 2011), alcohol use (e.g., Catanzaro and Laurent, 2004), cancer (e.g., Compas et al., 2017), problems or conflicts between parents (e.g., Nicolotti et al., 2003; Shelton and Harold, 2008), terrorism (e.g., Rhoades et al., 2007), and natural disasters (e.g., Vigna et al., 2010; Zhang et al., 2010) among others, have been studied.

Psychological symptoms and behavioral changes in children and adolescents from European countries, including Italy, Spain, and Portugal, during the COVID-19 quarantine, have been described from the results of cross-sectional studies (Espada et al., 2020; Francisco et al., 2020; Orgilés et al., 2020; Xie et al., 2020). These studies conclude that a significant percentage of children have presented emotional and behavioral symptoms associated with the quarantine, and that a lower percentage of children have healthy habits (in terms of exercise, use of screens, and sleep patterns), compared to before the COVID-19 confinement. These findings are especially valuable to understand the impact of the early stages of the pandemic on children's well-being but the coping strategies they used to adapt to the pandemic have not yet been explored. Although much is known about children and adolescents' (coping strategies in numerous stressful situations, to date, little is known about how they are coping with the COVID-19 situation. As coping behaviors may significantly mediate children's mental health when facing the stress derived from the pandemic, knowing children and adolescents' specific coping strategies that are more closely related to psychological well-being would be very useful to prevent problems and

intervene early in cases of risk. The objectives of this study were: (1) to examine the coping behaviors carried out by children and adolescents during the COVID-19 health crisis; (2) to analyze the differences in coping behaviors in children from Spain, Italy, and Portugal; and (3) to examine the relationship between different coping strategies and adaptation to home confinement.

## METHOD

### Participants

Participants were parents of 1,480 parents from three European countries (Italy  $n = 712$ , Spain  $n = 431$ , and Portugal  $n = 335$ ). The average age of the participating parents was 42.26 years ( $SD = 5.92$ ) and 87.8% were females. Sixty percent reported earning from 1,000 to 2,999 euros monthly, 7.4% earned 5,000 or more, and only 6.6% earned less than 1,000 euros. That is, the sample was predominantly middle class. Children were aged between 3 and 18 years ( $M = 9.15$ ,  $SD = 4.27$ ), and 47.2%

were females. Participants were equivalent across countries in all sociodemographic variables, except for going outdoors, the number of people living at home, square meters per home, and children's age. Italian participants were more likely to have a garden than Spanish participants. The Spanish sample was more likely than the Portuguese sample to have a terrace. Participants from Italy and Portugal reported having a higher average number of people living at home during the confinement. Portuguese participants had larger homes than the Spaniards and Italians. Portuguese children were slightly older than the Spanish children. **Table 1** describes the characteristics of the sample and differences across countries.

### Procedure

Participants were recruited in each country *via* social media (Facebook, Twitter, Instagram, and WhatsApp), as face-to-face contact was not allowed. An online survey was created *ad hoc* and distributed using a snowball sampling strategy. The

**TABLE 1** | Sample characteristics and equivalence by country.

	Total ( $n = 1,480$ )	Italy (1) ( $n = 712$ )	Spain (2) ( $n = 431$ )	Portugal (3) ( $n = 335$ )	Test <sup>a</sup>	Effect size <sup>b</sup>	Post-Hoc <sup>c</sup>
<b>Parents</b>							
Female, $N$ (%)	1,299 (87.8)	627 (88.1)	379 (87.9)	293 (86.9)	0.28	-	-
Age, $M$ ( $SD$ )	42.26 (5.92)	42.38 (6.64)	42.17 (5.32)	42.10 (4.96)	2.68	-	-
<b>Monthly family income (euros), <math>N</math> (%)</b>							
Up to 999	87 (6.6)	33 (5.3)	31 (8.3)	23 (7.3)	14.82	-	-
Between 1,000 and 1,999	372 (28.2)	164 (26.2)	113 (30.1)	95 (30.1)			
Between 2,000 and 2,999	417 (31.8)	209 (33.4)	98 (26.1)	110 (34.8)			
Between 3,000 and 4,999	343 (26)	169 (27)	106 (28.3)	68 (21.5)			
5,000 or more	98 (7.4)	51 (8.1)	27 (7.2)	20 (6.3)			
<b>The house where you live has, <math>N</math> (%)</b>							
Only windows	158 (10.7)	25 (3.5)	77 (17.9)	56 (16.6)	221.39***	0.27	2 > 1 3 > 1
Garden	559 (37.8)	368 (51.7)	77 (17.9)	114 (33.8)			1 > 2
Terrace	303 (20.5)	151 (21.1)	121 (28.1)	31 (9.2)			2 > 3
Balcony	416 (28)	141 (19.9)	145 (33.5)	130 (38.6)			2 > 1 3 > 1
Another exit	44 (3)	27 (3.8)	11 (2.6)	6 (1.8)			
<b>People who live in my house during quarantine, <math>N</math> (%)</b>							
They do not leave the house unless they have to buy groceries or other allowed activities	936 (63.1)	463 (65)	254 (58.9)	217 (64.4)	4.59	-	-
One or both parents still work outside the home	546 (36.9)	249 (35)	177 (41.1)	120 (35.6)			
How many people live in at home during quarantine, $M$ ( $SD$ )	3.94 (0.94)	3.99 (0.97)	3.84 (0.88)	3.98 (0.95)	9.73**	0.007	1 > 2 3 > 2
Square meters home, $M$ ( $SD$ )	131.04 (67.70)	123.14 (62.29)	124.99 (62.86)	152 (78.89)	46.80***	0.03	3 > 1 3 > 2
<b>Children</b>							
Female, $N$ (%)	699 (47.2)	351 (49.3)	192 (44.5)	156 (46.3)	2.58	-	-
Age, $M$ ( $SD$ )	9.15 (4.27)	9.40 (4.46)	8.55 (3.73)	9.42 (4.45)	8.58*	0.006	1 > 2

Note.  $M$ , Mean;  $SD$ , Standard Deviation; <sup>a</sup>Cross-table ( $\chi^2$ ) for categorical variables and Kruskal-Wallis ( $\chi^2$ ) for continuous variables. <sup>b</sup>Effect size = Cramer's  $V$  for multi-categorical variables and Epsilon-squared for continuous variables. <sup>c</sup>Bonferroni correction applied to  $p$  values was used to reduce the risk of type I errors post hoc analysis of a chi-squared test. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .



data collection period was the same in the three participating countries (lasting 15 days, with the study starting 15 days after the lockdown). Parents from 94 Italian cities, 94 Portuguese cities, and 84 Spanish cities participated in the study. To create the survey, scientific literature related to the psychological impact of quarantines was reviewed, and questionnaires applied in previous studies with adult population were considered. The survey collected sociodemographic information of parents and children (see **Table 1**), parental perception of how the quarantine affected their children emotionally, and parental perception of the coping strategies that their children used during the quarantine. The children's psychological responses to the quarantine were assessed through 31 symptoms on a scale ranging from 1 (*much less compared to before quarantine*) to 5 (*much more compared to before quarantine*) and grouped into six categories: anxiety symptoms (e.g., he/she is worried or is anxious), mood symptoms (e.g., he/she is sad or cries easily), sleep problems (e.g., he/she is afraid of sleeping alone or has nightmares), behavioral alterations (e.g., he/she often argues with other members of the family or is uneasy), feeding problems (he/she eats more or has no appetite), and cognitive alterations (e.g., he/she is very indecisive or has difficulty concentrating). As part of the same study, Francisco et al. (2020) previously explored psychological symptoms and behavioral changes in Spanish children and adolescents during the early phase of the COVID-19 confinement. Coping behaviors were measured using a list of eleven items that included the three dimensions proposed by Parker and Endler (1992): task-oriented (e.g., "Highlights the pros of being at home"), emotion-oriented (e.g., "Talks often about how he/she feels"), and avoidance-oriented (e.g., "Changes the subject when you try to talk to him/her about the coronavirus or quarantine"). Instead of a known measure, a specific list of statements was chosen to assess coping so that the content was specific to the COVID-19 context. Before completing the survey, information about the objectives of the study was provided, and informed consent was requested. The approval of the Ethics Board of the authors' institution was obtained for the research.

## Data Analyses

Descriptive statistics were used to describe the characteristics of the sample. The normal distribution of the data was tested using the Kolmogorov–Smirnov test. Nonparametric procedures were used because of the absence of normality ( $p < 0.05$ ). A total of 31 children's immediate psychological reactions were evaluated. Parents who informed that their children presented any of these reactions to a greater extent during home confinement (compared to before this period) were coded as 1 ("affected"), whereas the rest was coded as 0 ("unaffected"). A new variable (level of disturbance) was created by adding the 31 dichotomous variables of symptoms (score ranging from 0 to 31). The continuous variable (level of disturbance) was categorized into four groups: "unaffected" (The children had not worsened in any of the symptoms), "low impact" (had worsened in 1–3 symptoms), "medium impact" (had worsened in 4–9 symptoms), and "high impact" (had worsened in 10 or more symptoms).

Kruskal–Wallis tests were performed to analyze differences in coping styles (task-oriented, emotion-oriented, and avoidance-oriented) across the four groups of impact, and Chi-squared tests to compare proportions of children using each coping strategy (yes/no) across the levels of impact (four categories). A  $p$ -value under 0.05 was considered a statistically significant difference. To reduce the risk of Type I errors in multiple-comparisons across groups, Bonferroni corrections were applied to  $p$ -values (Beasley and Schumacker, 1995). For continuous variables, Epsilon-squared ( $\epsilon^2$ ) was used as an effect size, where small effect sizes range from 0.01 to  $< 0.08$ , medium effect sizes range from 0.08 to  $< 0.26$ , and large effect sizes range from  $\geq 0.26$ . For categorical variables, Chi-squared *post hoc* tests using adjusted residuals were performed. The percentage of children using each coping strategy was calculated to determine which ones were most frequently used by preschool children (3–5 years), school-age children (6–12 years), and adolescents (13–18 years). Cramer's  $V$  was calculated as a measure of association between multi-categorical variables, and interpreted as follows:  $> 0.25$  very strong,  $> 0.15$  strong,  $> 0.10$  moderate,  $> 0.05$  weak, and  $> 0$  none or very weak (Akoglu, 2018). The relationship between coping styles and different areas of impact (anxiety, mood, sleep, feeding, behavioral and cognitive alterations) was explored using Spearman correlations. All analyses were performed using SPSS 26 for Mac.

## RESULTS

### Coping Strategies

**Table 2** shows the proportion of children using coping strategies during the home confinement due to COVID-19. The most frequently used coping strategy was acceptance, with more than half of the parents reporting that their children use it (58.9%). Other commonly used coping strategies (at least 30% of the children) were collaborating with social activities such as drawings on windows or collective applauses (35.9%), ignoring the problem and acting as if nothing was happening (35.5%), highlighting the advantages of being at home (35.1%), seeking comfort from others (31%), and not showing concern about what was happening (30.1%). According to age, the most used coping strategies (more than 30% of parents reported that their children used them) were similar among preschool children, school-age children, and adolescents, although their order could differ for each group. In preschool children (3–5 years), the most used coping strategies were: accepts what's going on (45.5%) (Task-oriented); acts as if nothing is happening (44.4%) (Avoidance-oriented); doesn't seem to care what is happening (40%) (Avoidance-oriented); and seeks affection from others (36.9%) (Emotional-oriented). In the school-age children (6–12 years), the most used coping strategies were: accepts what's going on (60.6%) (Task-oriented); highlights the advantages of being at home (41.3%) (Task-oriented); seeks affection from others (33.8%) (Emotion-oriented); and acts as if nothing is happening (32.3%) (Avoidance-oriented). In the adolescent group (13–18 years), the most used strategies were: accepts what's going on (69.9%) (Task-oriented); highlights the advantages of being at home (37.9%) (Task-oriented); and acts as if nothing is happening (32.2%) (Avoidance-oriented). When comparing the

**TABLE 2** | Coping strategies by country.

	Total (n = 1,480)		Italy (1) (n = 712)		Spain (2) (n = 431)		Portugal (3) (n = 335)		Test <sup>a</sup>	Effect size <sup>b</sup>	Post-hoc
	N	%	n	%	n	%	n	%			
<b>Task-Oriented strategies</b>											
Asks very often about coronavirus or quarantine	355	24	166	23.3	91	21.1	98	29.1	6.92*	0.06	–
Highlights the pros of being at home	519	35.1	234	32.9	156	36.2	129	38.3	3.28	–	–
Uses humor when you talk about quarantine or coronavirus	226	15.3	99	13.9	60	13.9	67	19.9	7.17*	0.07	3 > 1 3 > 2
Collaborates with social activities	531	35.9	183	25.7	217	50.3	131	38.9	72.58***	0.22	2 > 1 2 > 3 3 > 1
Accepts what's going on	872	58.9	400	56.2	273	63.3	199	59.1	5.92	–	–
<b>Emotion-Oriented strategies</b>											
Often talks about how he/she feels	201	13.6	103	14.5	46	10.7	52	15.4	4.56	–	–
Says he/she is very angry about what is happening	220	14.9	121	17	64	14.8	35	10.4	7.89*	0.01	1 > 3
Seeks affection in others	459	31	199	27.9	167	38.7	93	27.6	17.01***	0.10	2 > 1 2 > 3
<b>Avoidance-Oriented strategies</b>											
Changes conversations when you try to talk to him/her about the coronavirus or quarantine	122	8.2	52	7.3	41	9.5	29	8.6	1.80	–	–
Acts as if nothing is happening	525	35.5	242	34	183	42.5	100	29.7	14.82**	0.10	2 > 3 2 > 1
Doesn't seem worried about what is happening	445	30.1	252	35.4	130	30.2	63	18.7	30.33***	0.14	1 > 3 2 > 3 1 > 2

<sup>a</sup>Cross-table ( $\chi^2$ ) for categorical variables. <sup>b</sup>Effect size = Cramer's V for multi-categorical variables. Bonferroni correction applied to p values was used to reduce the risk of type I errors post hoc analysis of a chi-squared test (resulting p-value = 0.0015). Only \*\*\*p < 0.0015 was considered statistically significant after applying for Bonferroni correction. However, differences that were significant at \*p < 0.05 and \*\*p < 0.01 were also indicated in the table.

three countries, and after applying for Bonferroni correction, Spanish children were more likely to collaborate in social activities than children from the other countries. Compared to the Italian children, those from Portugal were also more likely to collaborate in social activities. Spanish children were more likely to seek affection in others, compared to the rest of children. Italian children were more likely to act as if they were not worried about what was happening, compared to the rest. Compared to the Portuguese children, those from Spain were also more likely to seem worried about what is happening.

## Relationship Between Coping Strategies and Children's Immediate Psychological Responses

The psychological impact of the quarantine on children was measured through 31 symptoms grouped into six categories: anxiety symptoms, mood symptoms, sleep problems, behavioral alterations, eating problems, and cognitive alterations. Coping strategies were also grouped depending on whether they were task-, emotion-, or avoidance-oriented (Table 3).

Table 4 presents the Spearman correlations between task-oriented, emotion-oriented, and avoidance-oriented coping

**TABLE 3** | Coping strategies and psychological responses.

	Total (n = 1,480)	
	M	SD
<b>Coping strategies</b>		
Task-oriented strategies (range 0–5)	1.69	1.13
Emotion-Oriented (range 0–3)	0.59	0.76
Avoidance-Oriented (range 0–3)	0.74	0.83
<b>Symptoms (range 1–5)</b>		
Anxiety symptoms	2.64	2.53
Mood symptoms	1.72	1.62
Sleep problems	0.70	1.21
Behavioral alterations	1.51	1.62
Feeding problems	0.33	0.54
Cognitive alterations	0.36	0.61
Symptoms total (range 0–31)	7.25	6.10

M, Mean; SD, Standard Deviation.

styles and different areas of impact (anxiety, mood, sleep, eating, behavioral and cognitive alterations). The use of a task-oriented coping style was related to fewer symptoms in general, and fewer symptoms related to mood, sleep, behavioral, and

**TABLE 4** | Correlations with confidence intervals for coping strategies and child's immediate psychological responses.

Psychological responses	Task-oriented coping strategies	Emotion-oriented coping strategies	Avoidance-oriented coping strategies
Anxiety symptoms	−0.03[−0.08, 0.02]	0.28**[0.23, 0.32]	−0.20**[−0.25, −0.15]
Mood symptoms	−0.17**[−0.22, −0.12]	0.22**[0.17, 0.27]	−0.08**[−0.13, −0.03]
Sleep problems	−0.12**[−0.17, −0.07]	0.15**[0.10, 0.20]	−0.05*[−0.10, −0.00]
Behavioral alterations	−0.15**[−0.20, −0.10]	0.20**[0.15, 0.25]	0.00[−0.05, 0.05]
Feeding problems	−0.03[−0.08, 0.02]	−0.03[−0.08, 0.02]	0.06*[0.01, 0.11]
Cognitive alterations	−0.08**[−0.13, −0.03]	0.12**[0.07, 0.17]	0.01[−0.04, 0.06]
Symptoms total	−0.13**[−0.18, −0.08]	0.27**[0.22, 0.31]	−0.11**[−0.16, −0.06]

Note. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). \*indicates  $p < 0.05$ . \*\*indicates  $p < 0.01$ .

cognitive alterations. The relationships observed across these variables were small ( $\rho$  from  $-0.08$  to  $-0.17$ ). The use of an emotion-oriented coping style was related to a higher number of symptoms, more anxiety, mood disturbances, sleep, behavioral, and cognitive alterations. The relationships observed across variables were small ( $\rho$  from  $0.12$  to  $0.28$ ). The use of an avoidance-oriented coping style was related to fewer symptoms in all areas, including eating. The relationships observed across variables were small ( $\rho$  from  $-0.05$ ,  $-0.20$ ).

## Relationship Between Coping Strategies and Children's Level of Disturbance

Children were classified depending on their level of disturbance: "unaffected" (the children had not worsened in any of the symptoms), "low impact" (had worsened in 1–3 symptoms), "medium impact" (had worsened in 4–9 symptoms), and "high impact" (had worsened in 10 or more symptoms). **Table 5** shows the coping strategies used by children with different levels of disturbance. Of the 11 coping strategies, 8 were related to the level of disturbance. Children more psychologically affected by home confinement were more likely to use the following strategies: asking very often about coronavirus or quarantine, saying they were very angry about what was happening, seeking affection from others, and changing the subject when others tried to talk to them about the coronavirus or quarantine. Children with a lower level of disturbance due to home confinement were more likely to highlight the advantages of being at home, accept what was happening, act as if nothing was happening, and not seem worried about what was happening. The coping strategies "he/she uses humor when you talk about quarantine or coronavirus," "collaborates in social activities" and "often talks about how they feel" were unrelated to the level of disturbance due to home confinement in children's psychological reactions.

## DISCUSSION

The objective of the present study was to examine for the first time the strategies used by children and adolescents to cope with the quarantine imposed by governments to control the COVID-19. Another objective was to study the relationship between children's coping strategies and their emotional and behavioral responses to the home confinement to determine which strategy

is more useful to cope with the situation. Different rules of confinement were also analyzed, as three European countries participated in the study.

Results show that the most frequently used coping strategy was task-oriented (accepting what was happening), with 59% of parents reporting its use by their children. Also, at least 30% of the children collaborated in social activities, acted as if nothing was happening, highlighted the advantages of being at home, sought comfort from others, or did not seem worried about what was happening. Differences by countries show interesting results. Collaborating in social activities and seeking comfort from others were more likely in Spanish children than in children from the other countries. Compared to Portuguese and Spanish children, Italian children did not seem worried about what was happening. Although it is unclear, the different rules of confinement imposed by each country could explain these differences. Portugal followed voluntary confinement, so maybe children's routines did not change as much as in the other countries; the few cases of infections and deaths compared to Spain and Italy might have contributed to their not perceiving the situation as dangerous. Children from Spain used adaptive strategies to cope with the situation, such as collaborating in social activities, but they were also more likely to seek comfort from their parents. Spain had the most restrictive confinement rules, not allowing children to go outside until April 26th. Although more data are necessary to explain this finding, the interruption of all social contact and staying at home with the parents for such a long time could have encouraged Spanish children to seek more comfort than Portuguese and Italian children, who followed a less restrictive confinement. Also, Spanish children collaborated more in social activities, such as collective applauses from the balconies or windows, probably showing their need for social contact with others, which was limited indoors. Finally, Italian children seem less concerned about the situation than children from the other countries. Unlike Italy, Portugal used voluntary confinement, with habits and routines depending on each family's decision, so the children may have perceived inconsistent situations outdoors that might have worried them. Italian children were allowed to go outside before Spanish children, so Spanish children may have been more worried than Italian children because they had to follow the prohibition of going outside. Although

**TABLE 5** | Coping strategies based on the level of disturbance.

Coping strategies	(0) No affected n = 186	(1) Low Affected n = 311	(2) Middle affected n = 501	(3) High Affected n = 482	Test <sup>a</sup>	Effect size <sup>b</sup>	Pairwise
<b>Task-Oriented, N (%)</b>							
Asks very often about coronavirus or quarantine	36 (19.4)	48 (15.4)	107 (21.4)	164 (34)	43.20***	0.17	3 > 0 3 > 1
Highlights the pros of being at home	72 (38.7)	131 (42.1)	199 (39.7)	117 (24.3)	37.30***	0.15	0 > 3 1 > 3
Uses humor when you talk about quarantine or coronavirus	24 (12.9)	58 (18.6)	80 (16)	64 (13.3)	5.21	–	–
Collaborates with social activities (drawings on the windows, applauses)	71 (38.2)	118 (37.9)	168 (33.5)	174 (36.1)	2.20	–	–
Accepts what's going on	110 (59.1)	212 (68.2)	337 (67.3)	213 (44.2)	68.60***	0.21	2 > 3 1 > 3
<b>Emotion-Oriented, N (%)</b>							
Often talks about how he/she feels	21 (11.3)	37 (11.9)	71 (14.2)	72 (14.9)	2.48	–	–
Says he/she is very angry about what is happening	23 (12.4)	20 (6.4)	53 (10.6)	124 (25.7)	70.60***	0.21	3 > 2 3 > 1
Seeks affection in others	40 (21.5)	58 (18.6)	161 (32.1)	200 (41.5)	55.12***	0.19	3 > 0 3 > 1
<b>Avoidance-Oriented, N (%)</b>							
Changes conversations when you try to talk to him/her about the coronavirus or quarantine	7 (3.8)	9 (2.9)	33 (2.2)	73 (15.1)	48.87***	0.18	3 > 0 3 > 1 3 > 2
Acts as if nothing is happening	81 (43.5)	129 (41.5)	173 (34.5)	142 (29.5)	18***	0.11	0 > 3 1 > 3
Doesn't seem worried about what is happening	74 (39.4)	119 (38.3)	148 (29.5)	104 (21.6)	34.88***	0.15	0 > 3 1 > 3

Note. <sup>a</sup>Cross-table ( $\chi^2$ ) for categorical variables. <sup>b</sup>Effect size = Cramer's V for multi-categorical variables. Bonferroni correction applied to p values was used to reduce the risk of type I errors post hoc analysis of a chi-squared test (resulting p-value = 0.0011). Only \*\*\*p < 0.0011 was considered statistically significant after applying for Bonferroni correction.

further research is needed, allowing Italian children to go outside while maintaining consistent rules for all the children (a walk with one adult near their house) may have reduced their concerns.

A main objective of this study was to analyze the relationship between coping strategies and children's behavioral and emotional symptoms reported by parents. As there is a lack of studies examining how children cope with home confinement, we tried to explore which strategies were more related to children's well-being, and thus more useful for them to cope with the situation. Results show that children who use an emotion-oriented coping style have more behavioral and emotional symptoms (more anxiety, mood disturbances, sleep, behavioral and cognitive alterations). Contrarily, those who use a task-oriented or an avoidance-oriented coping strategy have fewer emotional and behavioral symptoms, specifically, fewer symptoms related to mood, sleep, behavioral and cognitive alterations. These results are in line with previous studies finding that emotion-focused coping, in which attention is not directed to solving the problem but to one's emotional experience (Sears et al., 2000), is usually related to internalizing symptoms, such as

anxiety or mood, and externalizing symptoms, such as behavioral alterations (Carlo et al., 2012).

To define which strategy could be more useful to cope with the quarantine, children were classified as unaffected, low impact, medium impact, and high impact, as a function of the number of symptoms reported. Results show that unaffected children or children with a lower level of impact are more likely to highlight the advantages of being at home, accept what is happening, act as if nothing was happening, and not seem worried about what was happening. Although a unique type of coping strategy related to psychological symptoms has not been found in this study, these four strategies have in common a positive focus on the situation. Contrariwise, children considered more psychologically affected used one of these four specific strategies to cope with home confinement: asking very often about coronavirus or quarantine, feeling angry about what was happening, seeking comfort from other members of the family, and changing the subject when the parents tried to talk to them about the situation. These coping strategies have been related to psychopathological symptoms in previous studies. Avoidance and rumination have been frequently associated with



anxiety and depression, whereas acceptance has shown a negative relationship with those symptoms (Schäfer et al., 2017). Asking frequently about the stressful situation may be considered as a strategy of rumination, which showed a high positive association with anxiety and depression symptoms, among other problems, in a meta-analysis that included studies carried out with children (Aldao et al., 2010). Avoidance had a small-to-medium positive association with anxiety and depression in that same meta-analytic review, supporting the finding of our study that indicate that changing the subject away from confinement is a typical coping strategy of psychologically affected children. Feeling angry or seeking comfort from others are also usual coping strategies shown by children for coping with distress (e.g., Miers et al., 2007; Zimmer-Gembeck and Skinner, 2011).

This study has some limitations and some strengths. The main limitation of this study is that the information was collected online from parents, as contact with the children was not possible due to the confinement situation. Despite the importance of applying self-reports, some previous studies have examined coping using measures completed by parents, as in the present study (e.g., Connor-Smith et al., 2000). In this study, children's coping strategies were evaluated, and these can be easily identified by people who live with the child (e.g., asks very often about coronavirus or quarantine or seeks affection from others). Therefore, parents were considered better informants than the children. Also, data collection *via* the parents allowed us to obtain information about younger children. Although it would have been desirable to use a multi-informant method, it was not possible due to the limited access to children during home confinement. Although the sample is not representative, it includes a large number of cities in three European countries (94 cities in Portugal, 94 in Italy, and 84 in Spain) and can be illustrative of the behavior of children and adolescents in the first weeks of the COVID-19 crisis. More studies are required to examine how coping behaviors developed during the health crisis are related to the onset of future psychopathology, especially through a longitudinal approach.

To our knowledge, this is the first study examining the coping strategies used by children during the quarantine for COVID-19. The following conclusions of the study may be highlighted. First, a task-oriented strategy was the most common in the

sample, although some differences between countries were found in the strategies used by children to cope with the situation. Second, children who used a task-oriented or an avoidance-oriented coping strategy showed fewer emotional and behavioral symptoms. Third, children who coped with the situation using positive strategies, such as highlighting the advantages of being at home, were less emotionally and behaviorally affected. The present study has provided information about the specific coping behaviors in the COVID-19 confinement that can be protective factors against psychopathological symptoms. Therefore, coping behaviors related to less disturbance should be promoted by educators and professionals in early interventions.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Órgano Evaluador de Proyectos de la Universidad Miguel Hernández de Elche. DPS.MO.01S.17.

## AUTHOR CONTRIBUTIONS

MO designed the study and the survey. JE designed this study and wrote the draft of this article. AM managed and analyzed data. ED designed the Italian survey and collected data. CM collected data. RF designed the Portuguese survey and collected data. MP collected data. All the authors reviewed the draft and contributed to the final version of the manuscript.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Corrigendum: Coping Behaviors and Psychological Disturbances in Youth Affected by the COVID-19 Health Crisis

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**Keywords:** quarantine, COVID-19, coping, stress, youth

## A Corrigendum on

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In the original article, there was an error. All results that were statistically significant were informed, rather than only those that were found to be significant after applying the Bonferroni adjustment.

A correction has been made to *Results, Coping Strategies, Paragraph 1*. The corrected paragraph is shown below.

**Table 2** shows the proportion of children using coping strategies during the home confinement due to COVID-19. The most frequently used coping strategy was acceptance, with more than half of the parents reporting that their children use it (58.9%). Other commonly used coping strategies (at least 30% of the children) were collaborating with social activities such as drawings on windows or collective applauses (35.9%), ignoring the problem and acting as if nothing was happening (35.5%), highlighting the advantages of being at home (35.1%), seeking comfort from others (31%), and not showing concern about what was happening (30.1%). According to age, the most used coping strategies (more than 30% of parents reported that their children used them) were similar among preschool children, school-age children, and adolescents, although their order could differ for each group. In preschool children (3–5 years), the most used coping strategies were: accepts what's going on (45.5%) (Task-oriented); acts as if nothing is happening (44.4%) (Avoidance-oriented); doesn't seem to care what is happening (40%) (Avoidance-oriented); and seeks affection from others (36.9%) (Emotional-oriented). In the school-age children (6–12 years), the most used coping strategies were: accepts what's going on (60.6%) (Task-oriented); highlights the advantages of being at home (41.3%) (Task-oriented); seeks affection from others (33.8%) (Emotion-oriented); and acts as if nothing is happening (32.3%) (Avoidance-oriented). In the adolescent group (13–18 years), the most used strategies were: accepts what's going on (69.9%) (Task-oriented); highlights the advantages of being at home (37.9%) (Task-oriented); and acts as if nothing is happening (32.2%) (Avoidance-oriented). When comparing the three countries, and after applying for Bonferroni correction, Spanish children were more likely to collaborate in social activities than children from the other countries. Compared to the Italian children, those from Portugal were also more likely

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to collaborate in social activities. Spanish children were more likely to seek affection in others, compared to the rest of children. Italian children were more likely to act as if they were not worried about what was happening, compared to the rest. Compared to the Portuguese children, those from Spain were also more likely to seem worried about what is happening.

Additionally, a correction has been made to *Discussion, Paragraph 2*.

Results show that the most frequently used coping strategy was task-oriented (accepting what was happening), with 59% of parents reporting its use by their children. Also, at least 30% of the children collaborated in social activities, acted as if nothing was happening, highlighted the advantages of being at home, sought comfort from others, or did not seem worried about what was happening. Differences by countries show interesting results. Collaborating in social activities and seeking comfort from others were more likely in Spanish children than in children from the other countries. Compared to Portuguese and Spanish children, Italian children did not seem worried about what was happening. Although it is unclear, the different rules of confinement imposed by each country could explain these differences. Portugal followed voluntary confinement, so maybe children's routines did not change as much as in the other countries; the few cases of infections and deaths compared to Spain and Italy might have contributed to their not perceiving the situation as dangerous. Children from Spain used adaptive strategies to cope with the situation, such as collaborating in social activities, but they were also more likely to seek comfort from their parents. Spain had the most restrictive confinement rules, not allowing children to go outside until April 26th. Although more data are necessary to explain this finding, the interruption of all social contact and staying at home with the parents for such a long time could have encouraged Spanish children to seek more comfort than Portuguese and Italian

children, who followed a less restrictive confinement. Also, Spanish children collaborated more in social activities, such as collective applause from the balconies or windows, probably showing their need for social contact with others, which was limited indoors. Finally, Italian children seem less concerned about the situation than children from the other countries. Unlike Italy, Portugal used voluntary confinement, with habits and routines depending on each family's decision, so the children may have perceived inconsistent situations outdoors that might have worried them. Italian children were allowed to go outside before Spanish children, so Spanish children may have been more worried than Italian children because they had to follow the prohibition of going outside. Although further research is needed, allowing Italian children to go outside while maintaining consistent rules for all the children (a walk with one adult near their house) may have reduced their concerns.

There were also errors in **Tables 2** and **5** as published. The corrected **Tables 2** and **5** are shown below.

The authors apologize for these errors and state that they do not change the scientific conclusions of the article in any way. The original article has been updated.

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**TABLE 2** | Coping strategies by country.

	Total ( <i>n</i> = 1,480)		Italy (1) ( <i>n</i> = 712)		Spain (2) ( <i>n</i> = 431)		Portugal (3) ( <i>n</i> = 335)		Test <sup>a</sup>	Effect size <sup>b</sup>	Post-hoc
	<i>N</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%			
<b>Task-Oriented strategies</b>											
Asks very often about coronavirus or quarantine	355	24	166	23.3	91	21.1	98	29.1	6.92*	0.06	–
Highlights the pros of being at home	519	35.1	234	32.9	156	36.2	129	38.3	3.28	–	–
Uses humor when you talk about quarantine or coronavirus	226	15.3	99	13.9	60	13.9	67	19.9	7.17*	0.07	3 > 1 3 > 2
Collaborates with social activities	531	35.9	183	25.7	217	50.3	131	38.9	72.58***	0.22	2 > 1 2 > 3 3 > 1
Accepts what's going on	872	58.9	400	56.2	273	63.3	199	59.1	5.92	–	–
<b>Emotion-Oriented strategies</b>											
Often talks about how he/she feels	201	13.6	103	14.5	46	10.7	52	15.4	4.56	–	–
Says he/she is very angry about what is happening	220	14.9	121	17	64	14.8	35	10.4	7.89*	0.01	1 > 3
Seeks affection in others	459	31	199	27.9	167	38.7	93	27.6	17.01***	0.10	2 > 1 2 > 3
<b>Avoidance-Oriented strategies</b>											
Changes conversations when you try to talk to him/her about the coronavirus or quarantine	122	8.2	52	7.3	41	9.5	29	8.6	1.80	–	–
Acts as if nothing is happening	525	35.5	242	34	183	42.5	100	29.7	14.82**	0.10	2 > 3 2 > 1
Doesn't seem worried about what is happening	445	30.1	252	35.4	130	30.2	63	18.7	30.33***	0.14	1 > 3 2 > 3 1 > 2

<sup>a</sup>Cross-table ( $\chi^2$ ) for categorical variables. <sup>b</sup>Effect size = Cramer's *V* for multi-categorical variables. Bonferroni correction applied to *p* values was used to reduce the risk of type I errors post hoc analysis of a chi-squared test (resulting *p*-value = 0.0015). Only \*\*\**p* < 0.0015 was considered statistically significant after applying for Bonferroni correction. However, differences that were significant at \**p* < 0.05 and \*\**p* < 0.01 were also indicated in the table.

**TABLE 5 |** Coping strategies based on the level of disturbance.

Coping strategies	(0) No affected n = 186	(1) Low Affected n = 311	(2) Middle affected n = 501	(3) High Affected n = 482	Test <sup>a</sup>	Effect size <sup>b</sup>	Pairwise
<b>Task-Oriented, N (%)</b>							
Asks very often about coronavirus or quarantine	36 (19.4)	48 (15.4)	107 (21.4)	164 (34)	43.20***	0.17	3 > 0 3 > 1
Highlights the pros of being at home	72 (38.7)	131 (42.1)	199 (39.7)	117 (24.3)	37.30***	0.15	0 > 3 1 > 3
Uses humor when you talk about quarantine or coronavirus	24 (12.9)	58 (18.6)	80 (16)	64 (13.3)	5.21	–	–
Collaborates with social activities (drawings on the windows, applauses)	71 (38.2)	118 (37.9)	168 (33.5)	174 (36.1)	2.20	–	–
Accepts what's going on	110 (59.1)	212 (68.2)	337 (67.3)	213 (44.2)	68.60***	0.21	2 > 3 1 > 3
<b>Emotion-Oriented, N (%)</b>							
Often talks about how he/she feels	21 (11.3)	37 (11.9)	71 (14.2)	72 (14.9)	2.48	–	–
Says he/she is very angry about what is happening	23 (12.4)	20 (6.4)	53 (10.6)	124 (25.7)	70.60***	0.21	3 > 2 3 > 1
Seeks affection in others	40 (21.5)	58 (18.6)	161 (32.1)	200 (41.5)	55.12***	0.19	3 > 0 3 > 1
<b>Avoidance-Oriented, N (%)</b>							
Changes conversations when you try to talk to him/her about the coronavirus or quarantine	7 (3.8)	9 (2.9)	33 (2.2)	73 (15.1)	48.87***	0.18	3 > 0 3 > 1 3 > 2
Acts as if nothing is happening	81 (43.5)	129 (41.5)	173 (34.5)	142 (29.5)	18***	0.11	0 > 3 1 > 3
Doesn't seem worried about what is happening	74 (39.4)	119 (38.3)	148 (29.5)	104 (21.6)	34.88***	0.15	0 > 3 1 > 3

Note. <sup>a</sup>Cross-table ( $\chi^2$ ) for categorical variables. <sup>b</sup>Effect size = Cramer's V for multi-categorical variables. Bonferroni correction applied to p values was used to reduce the risk of type I errors post hoc analysis of a chi-squared test (resulting p-value = 0.0011). Only \*\*\*p < 0.0011 was considered statistically significant after applying for Bonferroni correction.



# Coping With COVID-19: Mindfulness-Based Approaches for Mitigating Mental Health Crisis

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The novel coronavirus disease COVID-19 that first emerged in Wuhan, China, in Nov-Dec 2019 has already impacted a significant proportion of the world population. Governments of many countries imposed quarantines and social distancing measures in 2020, many of which remain in place, to mitigate the spread of the SARS-Cov-2 virus causing the COVID-19 disease. The direct impact of COVID-19 on people infected with the virus, their families and the health care workers, as well as the impact of the mitigation measures such as quarantine, social distancing, and self-isolation on the rest of the population have contributed to a global mental health pandemic, including anxiety, depression, panic attacks, posttraumatic stress symptoms, psychosis, addiction, obsessive-compulsive disorder, and suicidality. These effects are present acutely (for example, due to fear of contamination or losing loved ones, effects of quarantine/isolation, withdrawal of community and social services, etc.) and may continue long after the pandemic is over (for example, due to bereavement, unemployment, financial losses, etc.). The COVID-19 pandemic has triggered mental health problems in people without previous history of mental illness, as well as worsened the symptoms in those with pre-existing psychiatric diagnosis. Therefore, the global effort is called for to deal with this mental health pandemic secondary to COVID-19 itself to address the emergence of new as well as the exacerbation of the existing mental health issues. Conversely, this global context provides an extraordinary opportunity for studying individual differences in response to and resilience in the face of physical and psychological threat, challenge to “normal” way of life, and long-term uncertainty. In this viewpoint article we outline the particular suitability of mindfulness, its skills and mechanisms, as an approach to the prevention and management of mental health issues, as well as to the promotion of well-being and building the foundations of adaptability and flexibility in dealing with the long-term uncertainty and profound changes to the social, economic, and possibly political systems as this pandemic continues to unfold.

**Keywords:** COVID-19, mental health, mindfulness, depression, anxiety, PTSD, psychosis, coping

## INTRODUCTION

The novel coronavirus disease COVID-19 that first emerged in Wuhan, China, in Nov-Dec 2019 is continuing to spread rapidly with over 94 million confirmed cases world-wide (1). To minimize its human-to-human transmission rates, governments of many countries imposed quarantines and social (physical) distancing measures in the first quarter of 2020 that lasted for months, and have been reinstated in the last quarter of 2020 in many countries, including the UK, that are witnessing a severe outbreak due to more transmissible variants of the SARS-Cov-2 virus. The direct impact of COVID-19 on people infected with the virus, their families and the health care workers, as well as the indirect impact of the mitigation measures such as quarantine, social distancing and self-isolation on the rest of the population has led to a global mental health crisis (2–5) that calls for a global effort in dealing with. This global context also provides an unprecedented opportunity for studying the factors and mechanisms underlying individual differences in response to, and resilience in the face of, an unprecedented challenge to one's "normal" way of life in the context of physical as well as psychological threat and uncertainty.

The international scientific community has risen to the challenge, first in the fields of virology and epidemiology, with the psychology and neuroscience of mental health gathering a strong momentum in appraising the evidence from previous pandemics as well as the data generation during the current pandemic to inform governmental policies for public health interventions and provision. A rapid evaluation of evidence by Brooks and colleagues (6) published in *Lancet* shortly before the start of quarantine period in the UK and many other countries reviewed the psychological impact of quarantine during previous pandemics and found most studies to report negative psychological effects including post-traumatic stress symptoms, confusion, and anger. The identified stressors for worse mental health outcomes included longer quarantine duration, infection fears, inadequate supplies, inadequate information, financial loss, frustration, boredom, and stigma, with suggestions of long-lasting effects for the mental health issues. It is becoming increasingly evident that the same stressors and psychological effects, as well as information transparency, supplies of necessities, and appeals to the altruistic behavior for the wider societal benefit as mitigators are indeed relevant to the current pandemic (7).

There is significant evidence that the COVID-19 pandemic has triggered mental health problems in people without any previous history of mental illness and worsened the symptoms in those with pre-existing psychiatric diagnosis (3–5). The common mental health problems reported during the Wuhan lockdown imposed between January and March of 2020 included fear, anxiety, depression, and sleep problems in patients with COVID-19 infections, close contacts, the public, and the health care professionals (8–10). The mental health situation in Wuhan was particularly challenging for the subpopulations with existing mental health difficulties, with patients having serious psychiatric needs being considered to be highly vulnerable population to contract COVID-19 (11). Hundreds of patients with psychiatric

disorders, as well as mental health professionals, were infected in China (12). Similar findings have since then emerged from other countries and cultures (4, 5). There are also reports of coronavirus infection-related delusions and hallucinations in vulnerable people from China (13) and elsewhere (14). A range of negative mental health consequences are likely during the pandemic (for example, due to fear of catching coronavirus infection, underlying health conditions, losing loved ones due to COVID-19, withdrawal of other healthcare and community services, or a consequence of quarantine measures) and for years to come after it is over (for example, trauma due to the experience of illness or bereavement, survival guilt, unemployment and financial losses) (6, 15).

Quarantine is a necessary preventive measure during major infectious outbreaks but its negative mental health impacts, especially if lasting for more than a few weeks, are also well-documented (6). According to the poll published by the Office of National Statistics (16) in the UK, 85.2% respondents are worried about the effect that coronavirus is having on their life, with 53.1% having stated the coronavirus pandemic has impacted their well-being, and 46.9% reporting high levels of anxiety. Importantly, the general population survey by Ipsos MORI (17) revealed that becoming unwell with COVID-19 disease was ranked lower than the concerns regarding psychological effects of social (physical) distancing on well-being, including increased anxiety, depression, stress, and other negative feelings. The survey by the mental health charity MQ highlighted concerns about the impact of social isolation and increased feelings of anxiety and depression in people with lived experience of a mental health issue. In addition to growing concerns about the impact of isolation on mental health in the general public, there is a clear recognition that the coronavirus pandemic will put the healthcare workers at risk of burn-out and post-traumatic stress disorder. Even after the quarantine/lockdown measures are eased in the UK and elsewhere, we will have to live most likely with a new "normal" for an extended period of time, facing social and economic uncertainty, with a high fear/probability of future waves of infection spread, followed by the periods of stricter restrictions on our way of life to contain and manage the pandemic. The short and long-term impacts on the global economy is likely to have a devastating effect on mental health, affecting ever increasing number of people worldwide.

In what follows we provide a theoretical perspective on why mindfulness-based approaches might be well-suited for responding to the current mental health challenges and managing the short- as well as long-term impact on mental health of the pandemic itself and measures to mitigate it. It should be noted that by "suitability" we do not imply "superiority" to other alternative or complimentary approaches that might also be suitable in the context of COVID-19 pandemic (18, 19). We use the term "approaches" (which is broader than "interventions") to discuss the suitability of mindfulness and its skills that could be trained by many different means, including in the context of mindfulness-based interventions, using online apps/mp3s, joining online drop-in sessions led by experienced mindfulness instructors/teachers, etc. The systematic reviews and meta-analysis of mindfulness-based interventions (MBIs) on a



range of conditions have been conducted (20, 21), including the effects on depression, anxiety and stress reduction in older adults (22) and post-traumatic stress (23). We acknowledge that more rigorous studies are needed to evaluate the efficacy of MBIs and further clarify their mechanisms of action [for the evaluation of the state of the field in terms of methodological rigor please see (24, 25)]. Here we aim to present an appraisal of mindfulness's suitability in terms of its theoretical underpinnings and known mechanisms of action in the context of the stressors, demands, and challenges of COVID-19 pandemic.

## MINDFULNESS SKILLS, TRANSDIAGNOSTIC MECHANISMS, AND RELEVANCE TO THE COVID-19 PANDEMIC

### What Is Mindfulness?

*Mindfulness*, one of the words used to translate the Pali term *sati*, in the secular context is defined as “the awareness that arises when paying attention on purpose, in the present moment, and non-judgmentally” (26). This definition has three elements to characterize mindfulness as: (i) our innate ability of attention to bring our experiences to the forefront of our awareness; (ii) a process of doing so with an intention of directing it toward the present-moment experiences, without judging them as likable or dislikeable, pleasant or unpleasant, “good” or “bad”; and (iii) awareness with certain qualities that arises as a “result” of applying the ability and the process, which include openness, receptivity, spaciousness, and “stillness” or steadiness that is able to hold any “movement” within it, such as thoughts, emotions, body sensations, or any external stimuli coming from our senses.

It is important to note that the scope of what is denoted by the term *mindfulness* in the secular context exceeds the use of mindfulness as a translation of *sati* in the context of Buddhist meditation praxis methods [for an extensive and comprehensive discussion of the differences, please see the special issue on Mindfulness in Contemporary Buddhism, 2011]. Briefly, this mainly stems from a different approach to meditation practice within different traditions of Buddhism, from which mindfulness as a concept made its way into the secular clinical and scientific context. We do not aim to solve this debate here, but merely point out that when we use the term *mindfulness* in this viewpoint article and the related secular approach to mindfulness practice, we mean it in the way in which Jon Kabat-Zinn has originally intended it (27). The term *mindfulness* in secular usage denotes a far broader range of concepts than used in Buddhist philosophy, psychology and praxis (27), including mindful awareness, which is “captured” by different concepts and referent terms depending on the school of Buddhism. Mindful awareness is referred to as *choiceless awareness* in the context of Mindfulness-Based Stress Reduction (MBSR) (28) and Mindfulness-Based Cognitive Therapy (MBCT) (29). Other terms used for it in the secular context is *open presence* (30) or *non-dual mindfulness* (31). These distinctions between traditional Buddhist and secular usage of the term *mindfulness* in terms of the breadth of the definition/conceptual capture are important to note in relation to identifying the mechanisms affording change, both psychological

and behavioral. That is, when researching the mechanisms and effects of mindfulness on cognition, emotional regulation and neural dynamics, it is important to be precise regarding the definition and specific aspect(s) of mindfulness (i.e., ability, process or “result”) being studied.

Mindfulness practice as incorporated in Mindfulness-Based Interventions (MBIs) is contrasted with more effortful concentration-based practices, such as taught in Theravada Buddhism (32). The traditions of Buddhism most closely aligned with mindfulness approach intrinsic to MBSR and MBCT are Dzogchen and Mahamudra of Tibetan Buddhism, which take more gentle and effortless approach to practice by letting go of any striving in achieving any particular mental state and simply resting in a present-centered awareness that is non-preferential to the experiential content, free of emotional reactivity to it and conceptual elaboration upon it, whilst being cognizant of experiences as they arise and dissolve in awareness (27, 31). Hence, the attitudes toward mindfulness practice encouraged by MBSR and MBCT include curiosity toward experience, acceptance of what is there to be experienced (which does not entail a passive resignation but rather openness and receptivity as an opposite of experiential avoidance and suppression), non-striving, non-judging one's practice and oneself, and adopting a beginner's mind (suspending preconceived ideas and beliefs about the experiential content and one's identity).

### Mindfulness Skills

The list of beneficial skills afforded by mindfulness practice is potentially long. Here, we will mention a few that we consider to be most relevant to the discussion of the relevance of mindfulness to the context of adopting to challenges presented by the COVID-19 pandemic.

Mindfulness skills captured by the self-report measure *Five Facet Mindfulness Questionnaire* (FFMQ) (33) include: *observing*, *non-judging*, *non-reacting*, *acting with awareness*, and *describing*. *Observing* involves deliberately turning toward and noticing present-moment experiences during daily activities, such as body sensations during walking, showering and eating, or sensory stimuli, such as sounds, smells, or sights. *Non-judging* taps into the tendency to judge one's experiences, emotions, feelings and thoughts, as irrational, inappropriate, or bad, as well as the tendency to be critical of oneself more generally. *Non-reactivity* refers to the ability to be aware of the distressing feelings, thoughts or images without getting caught up in them, noticing them in a decentred way, letting go of them, and returning to feeling calm soon after they have passed. *Acting with awareness* measures the propensity to get distracted from the present-moment experience by mind-wandering (day-dreaming, worrying), running on automatic pilot, and rushing through activities without giving them attention. *Describing* refers to the ability to put one's sensations, feelings, thoughts, beliefs, opinions into words and the tendency to do so. Although there is somewhat of a debate as to whether the ability to act with awareness could be captured by its “opposite”—the propensity for “mindlessness” or lapses of attention, or whether ability to describe is one of the core mindfulness skill [for an in-depth discussion see (34)], there is a consensus that the other three

facets, *observing*, *non-judging*, and *non-reacting*, constitute the core of mindfulness as a trait, both as a personality disposition as well as acquired through formal (e.g., meditation) and informal (daily life) mindfulness practice.

## Transdiagnostic Mechanisms of Action and Implications for the COVID-19 Pandemic

Detailed accounts of the mechanisms underpinning transdiagnostic efficacy of mindfulness practice have been elaborated in relation to depression relapse prevention (35) and more generally for managing psychopathology, as well as promotion of mental health and well-being (36). Wielgosz and colleagues (37) have provided the most recent review of the current understanding of how skills (or capacities) acquired through mindfulness practice translate into its efficaciousness across the psychopathologies, including depression, anxiety, post-traumatic stress, eating disorders and substance abuse by mapping them onto cognitive and affective constructs of the Research Domain Criteria matrix adopted by the NIH (38). Here we briefly outline the most established effects and mechanisms of transdiagnostic efficacy before discussing the relevance of mindfulness to COVID-19 context.

Neuroticism has an established link to psychopathology, both as an efficient marker of non-specified general risk for the common mental disorders (CMDs) (39) and through the association with the CMDs (40). Neuroticism is strongly inversely correlated with *non-reacting* and *non-judging* as dispositional mindfulness traits (41). The relationship between mindfulness and psychological well-being is mediated by the self-compassion (42), with self-compassion being the indirect gain (i.e., not explicitly taught) of the MBCT (43). Self-compassion attenuates anxiety after an ego-threat, and an increase of self-compassion over a one-month period has been shown to augment psychological well-being (42). The practice of mindfulness thus promotes psychological well-being directly via decreased neuroticism due to the acquisition of *non-judging* and *non-reacting* skills, with the benefits being further enhanced by the increases in self-compassion. Self-compassion in the face of negative thoughts has emerged as a key component of the mechanism of change afforded by MBCT (35). Neuroticism as a trait associated with increased stress vulnerability also links to the direct effect of mindfulness on psychological stress reactivity (43).

The relationship with experiences as transient events in the mind attained via *observing*, *non-judging*, and *non-reacting* skills is akin to the concept of *decentering* in Cognitive-Behavioral Therapy (CBT); learning to experientially decenter through CBT has been linked to the CBT's efficacy in depression relapse prevention (44). Other terms related to this skill are *cognitive diffusion* (45) and *dereification* (46). The experiential mode captured by these terms stands in contrast with self-referencing (identification or fusion with the thoughts and experiences as “me” or “mine” rather than perceiving them as passing events in the mind), and is distinct from the states of dissociation, depersonalization, or derealisation that are associated with psychopathology. This non-elaborative (i.e., simply noticing/observing without reappraisal), non-judgmental,

and non-reactive way of processing and relating to experiences, whether they are thoughts, feelings or body sensations, characterize mindfulness as an emotion regulation strategy (47).

Increased self-referencing has been linked to a number of common mental disorders; for example, in a form of rumination in depression or paranoid thoughts in psychosis and schizophrenia. Self-referencing has been linked to the function of the Default Mode Network (DMN) (48). The DMN hyperactivity and over-connectivity has been observed in schizophrenia and depression (49), predicted the post-traumatic stress disorder (50), and is altered in insomnia disorder (51), amongst other psychopathologies (we mention most relevant to the impact of COVID-19 on mental health). The ability to attenuate self-referential processing associated with the DMN activity is enhanced by mindfulness practice (52). This, in part, appears to underpin brain's increased efficiency of information processing (53), relapse prevention in depression (54), and general well-being associated with mindfulness (36).

As argued by Brewer et al. (55) and demonstrated using functional magnetic resonance imaging neurofeedback in conjunction with subjective reports, the DMN's sustained activity, and particularly that of the posterior cingulate region, when processing self-related content (e.g., sensations, memories, emotions, thoughts) may represent “getting caught up in” one's experiences rather than narrative self-referential processes *per se*. Hence, the effect of mindfulness practice on downregulating the DMN activity associated with “sticky” narrative self-referencing alone theoretically underpins its utility for the prevention and management of CMDs (56), as well as for the promotion of mental health and well-being (38).

Related to this is the development of the capacity to disengage from *attention capture* by future- or past-orienting thinking [self-projection, (57)]. Self-projection, also associated with the function of the DMN, is known to be biased toward negative affect (e.g., regret about the past or worry about the future) and maladaptive thinking patterns more generally (58). The inability to disengage from such patterns leads to repetitive negative thinking or proliferation of ruminative self-referential thought, contributing to depression, anxiety, addictive craving, and general stress reactivity (59–61). *Attention capture* is not limited to internal events (e.g., thoughts); for example, visual stimuli of negative valence create stronger fixation than neutral ones (62). In addition to attenuating the activity of DMN, mindfulness training is thought to reduce *attention capture* and enable more efficient disengagement when the fixation occurs via enhanced conscious executive control and entrainment of automatic regulatory circuits (46), as well as improved interoception (63, 64). Reductions in *attentional capture* is thus another important transdiagnostic mechanism by which mindfulness practice can ameliorate the formation of new, resurfacing of past, and exacerbation of the present mental health issues in the context of COVID-19.

Next, we consider the notion of the *beginner's mind* (*shoshin* in Japanese used in Zen Buddhism) that is not currently well-conceptualized in the cognitive approaches to mindfulness. It refers to having an attitude of openness and readiness to experience even the most mundane and repetitive mental events

as new, fresh, and free of preconceptions. We showed attenuated startle habituation, which we conceptualized as an index of openness toward repetitive aversive stimuli, in experienced mindfulness practitioners (65). Buddhist psychology posits that one of the reasons for the discontent or dis-ease that even people with no psychiatric diagnosis often experience is a rapid habituation to sensory stimulation, leading to wanting new or higher intensity experiences. In healthy meditation-naïve adults, faster startle habituation is associated with impulsivity, behavioral disinhibition, and sensation seeking (66). Mindfulness practice might thus allow for fresh and alert attention to each incoming stimulus, no matter its valence or familiarity. This might lead to experiential novelty and appreciation of even the most mundane (one of the functions of a “raisin exercise” that opens the MBSR programme is to do just that—to provide an experience of novelty and appreciation of the sensory experience of touching, smelling, and savoring a raisin by adopting mindful awareness). This effect of mindfulness practice in the context of COVID-19 might serve to reduce aggressive or violent behaviors driven by increased irritability and impulsivity that could be brought about by the strict social distancing measures, such as lockdown or quarantine.

Additional relevance of the *beginner's mind* is its possible link to creativity through the ability to see things in a new light and from “out-of-the box” perspectives. In the words of Shunryu Suzuki who popularized the notion of the *beginner's mind* in the book *Zen Mind, Beginner's Mind* (67): “In the beginner's mind there are many possibilities, in the expert's mind there are few.” [p. 21]. Long-term mindfulness meditators exhibit higher divergent thinking (an aspect of creativity assessed by the performance on Alternative Uses Task), which was found to correlate with their mindfulness practice expertise and to be accompanied by an inverse relationship with inter-hemispheric functional connectivity between the main nodes of the DMN (medial prefrontal and posterior cingulate areas) (68). Previous research has linked divergent thinking with greater ability for creative problem solving, over and above the effects of intelligence or expertise (69). Together, these findings present a possibility that the practice of mindfulness might facilitate creative problem solving when dealing with the social and economic aftermath of the pandemic, on both individual and governmental levels.

The final aspect of COVID-19 pandemic that we consider where mindfulness mechanisms might have an important beneficial implication and application is dealing with grief. Grief is a natural response to loss, which can take many forms in the context of COVID-19 pandemic: the death of a loved one; a loss of job, business or important relationship; deterioration of physical and/or cognitive functioning due to COVID-19 illness; a loss of mental equilibrium; or a loss of motivation, sense of purpose and meaning in the face of persistent uncertainty and existential threat.

The beneficial effects of mindfulness on dealing with loss and grief are commonly assumed, with many free resources having been made available for using mindfulness to deal with grief since the start of the pandemic. The very few empirical studies that have assessed the effect of mindfulness-based

interventions on grief have indicated promising effects, yet to be confirmed in more rigorously designed larger-scale studies. MBSR in chronic pain patients (70) was found to facilitate a quicker transition through the initial stages of grieving process as compared with the control group of patients seeking or receiving medical assistance. MBSR in breast cancer patients (71) showed significant improvements in existential well-being as well as the reduction in a number of self-identified losses and associated grief.

Theoretical models based on the known mechanisms of mindfulness have been proposed for the use of mindfulness practices for treatment of traumatic and complicated bereavement [e.g., (72)]. MBCT in bereaved individuals was found to significantly improve both executive function and emotion regulation by alleviating emotional interferences on cognitive functions (73), as well as to reduce self-reported anxiety concurrent with increases in self-reported mindfulness that were associated with inter-network reorganization within the brain during the resting state (74).

The Kübler-Ross grief model (75) postulates five stages that those who go through a grieving process may experience, each associated with a distinct emotion: denial, anger, bargaining, depression, and acceptance. Acceptance is inherent to mindfulness process as an attitude or orientation adopted during mindfulness practice toward the experiential content, supporting non-reactivity and experiential openness (32). Mindfulness practice when dealing with loss and grief can bring about an understanding and acceptance of transient and ever-changing nature of all our experiences, whether mental (thoughts, emotions, body sensations) or physical (events, things, relationships). This experiential understanding of all phenomena as being “impermanent” (76) might prove to be an important mechanism for promoting positive adaptation to a highly unpredictable and constantly changing landscape of COVID-19 pandemic. Mindfulness practice has also been shown to increase the sense of meaning, rather than search for meaning *per se*, in a longitudinal study (77), suggesting that grief due to the loss of purpose and meaning, which might be brought about by rapidly changing circumstances, could be regained through mindfulness practice.

## DISCUSSION

### Mindfulness Provision for COVID-19: Now and the Road Ahead

Given the outlined relevance of mindfulness practice and associated skills to dealing with the mental health crisis as secondary to the COVID-19 pandemic, we now discuss its current place within the mental health advice and provision offered through the National Health Service (NHS) in the UK (with implications for health care services elsewhere), as well as offer suggestions for increasing the benefit that could be afforded by a greater exposure and more coordinated implementation.

In recognition of the psychological effects of social distancing and isolation on the UK population, Public Health England's *Every Mind Matters* platform has launched new advice,

focused on looking after people's mental well-being during the coronavirus (COVID-19) pandemic. It includes a tailored COVID-19 Mind Plan with content for dealing with specific mental health and well-being issues such as anxiety, stress, low mood and sleep disturbances by signposting the individuals to activities such as mindful breathing exercises, help reframing unhelpful thoughts, and muscle relaxation. The *NHS in Mind* app, rolled out at the end of March 2020, provides a set of free resources designed to help NHS staff to deal with high anxiety, panic and fatigue whilst dealing with the unprecedented demands of their profession in the context of COVID-19. The resources offered include mindfulness-based approaches, such as a 3-min breathing space. *The Mindfulness Initiative* has compiled the list of online resources with the NHS staff in mind that could be accessed via their website.

Whilst we welcome such recommendations and signposting to freely available mindfulness-related resources for the general public and the NHS workers, our opportunistic survey of uptake by the target groups has revealed that the engagement with the free online resources particularly amongst the healthcare professionals is very low, with about 1–2% accessing the recommended materials and <1% doing so consistently. Experienced mindfulness instructors across the UK have been providing free Zoom sessions for the NHS staff during their shifts at different times of day across the weekdays and the weekend to enable flexible participation. However, participation has been limited to single digit numbers of NHS professionals per Zoom group/session. Given how supportive mindfulness practice can be for this target group, the reasons for the low uptake need to be understood. According to the mindfulness instructors we have surveyed, the engagement with the Zoom mindfulness sessions during staff break periods appears to be higher in the NHS trusts/hospitals where it is encouraged by the management.

Our online focus group ( $N = 11$ , all female, comprised of the general practitioners and nurses working for the National Health Service (NHS) in London, UK) that explored the reasons for the low uptake amongst the healthcare professionals suggest a number of possible reasons. First, these highly altruistic individuals have difficulty in “giving care to themselves” even though they recognize the benefits that mindfulness practice can offer them in general, and at this time in particular. Second, a popularized notion that mindfulness expertise development requires at least 10,000 h of practice creates the erroneous belief that extensive practice is required to start experiencing the benefits of mindfulness practice. Being close to burn-out due to the workload, plus having to balance long shifts with family responsibilities, the idea of starting something that will require many hours of practice before the tangible effects will be felt as off-putting. 10,000 h of practice might be a useful criterion to apply for research purposes to define mindfulness practice expertise in the absence of established and reliable objective markers, but it appears to be unhelpful for encouraging individuals to initiate mindfulness practice. Even a simple instruction for mindful emotion regulation of pain experience in meditation-naïve individuals produced the same phenomenological and neural effects as would be expected in experienced mindfulness practitioners (78). A clear distinction should be made when providing a rationale for

mindfulness-based approaches between the dose-related effects of mindfulness practice in terms of skills' transfer from state to trait vs. potential benefits gained from mindfulness as a state induced by a single practice session with expected 'spill over' effect, even if short-lived at the early stages of practice development, for dealing with daily pressures and stressors.

Related to this is a common belief that mindfulness practice requires effort. Again, in the context of exhaustion faced particularly by the health professionals, this belief is counter-productive in encouraging this population to test the benefits of mindfulness practice for themselves. Instead, the information on mindfulness resources should emphasize that secular mindfulness approach rests on the notion of non-striving; the only “effort” required is in remembering to come back to the present-moment experience whenever the mind becomes distracted by or caught up in the experiences. Mindfulness should be presented as an opportunity to create space, however brief, for diffusion of daily trauma that the mental health professionals in particular are exposed to.

We would also like to suggest providing more in-depth rationale for mindfulness practice in terms of its benefits when offering/recommending it to the target populations to fully harness its potential as a preventative cost-effective public intervention. The signposting materials we have surveyed thus far tend to present it as one of the alternatives to other methods of coping, such as distraction by a pleasurable activity, hobby or similar. However, distraction can be adaptive or maladaptive as an emotion regulation strategy depending on whether it is combined with acceptance or avoidance (79). Acceptance has been shown to be associated with positive psychological outcomes [e.g., (80, 81)]. Emotional avoidance, on the other hand, is associated with higher levels of anxiety and affective distress [e.g., (82)]. Nakamura and Orth (83) proposed the distinction between active acceptance, associated with positive psychological outcomes, and resigning acceptance, associated with negative psychological outcomes, and showed active acceptance to be an adaptive response to unchangeable situations. Active acceptance involves experiential openness (84), which is facilitated by mindfulness practice, and is one of the attitudes toward the experiential content adopted during mindfulness practice. Therefore, a combination of mindfulness practice followed by a pleasurable activity and hobby may have a more positive effect on well-being than distraction alone, which is likely to be used as avoidance-type coping with stress and anxiety in COVID-19 context.

We have also found in our own experience of signposting to the freely available online resources as well as offering virtual mindfulness courses and drop-in mindfulness sessions to the NHS staff, University students and University staff (both academic and professional) that there is a great appreciation for the group setting, in terms of support of the contact with a mindfulness instructor for the understanding of the rationale and the know-how of mindfulness practice *per se*, as well as the normalizing and supportive effects of shared group experience. Therefore, our recommendation for the provision of mindfulness-based support during the COVID-19 pandemic is to offer free virtual mindfulness sessions/courses with trained and experienced mindfulness instructors whenever possible, in



addition to signposting to free online resources that could be supportive for personal practice in between regular virtual group sessions.

One notable “success” story in terms of uptake from our survey of online resources is *Headspace*, a private company teaching meditation via a website or a phone app, which has seen a surge in the uptake of its products since mid-March 2020, most notably a doubling of the downloads of the app; 14-fold increase in users completing a free guided meditation for relieving stress; 110% increase in the usage of a “buddy” support; and 70% increase in free live group meditation starting-out sessions. The latter two figures highlight the need for inter-personal support and the value of shared practice experience sought by the users at this time. In recognition of the benefit that mindfulness practice can bring particularly to the health professionals, *Headspace* has been offering free access to its products for US healthcare professionals working in public health settings and all NHS staff to support them in dealing with the present crisis. Given that *Headspace* has a strong emphasis on establishing the evidence-base for their products through collaborative partnerships with academics and is highly popular at a workplace as well as amongst younger users, utilization of its products might be worth considering by the policy makers in the UK and in other English-speaking countries when developing strategies around coordination of mindfulness-based support for mitigating mental health pandemic secondary to COVID-19. Additionally, international collaborative effort is required to develop multilingual evidence-based free online resources to support populations in the face of deteriorating economic conditions globally, and particularly in low and middle income countries.

The intra- and inter-national collaborations on mental health management, provision, and research are essential in dealing with the challenges of the present pandemic and in preparing the best and timely response for the possible future ones. Xiang et al. (2) called for a joint international collaboration to combat mental health challenges during the global COVID-19 pandemic faced by the mental health professionals due to the lack of relevant guidelines and stretched mental health resources in particular. Holmes and colleagues (85) stressed the importance of high-quality data collection on the mental health effects of the COVID-19 pandemic across the whole population and vulnerable groups.

We would like to propose that in addition to understanding the effects of the pandemic on mental illness, the pandemic presents an unprecedented opportunity for studying the factors for resilience, and particularly the role of mindfulness practice, whether in the form of meditation, yoga, qigong, or other, across countries and cultures. Systematic research is urgently needed to examine if adopting these mindfulness-based approaches can not only offset many of the negative mental health consequences, but also help individuals channel the COVID-19-related stress toward positive growth and resilience (86).

The research should also consider the possibility of “negative effects” of mindfulness. As many other phenomena, mindfulness practice appears to follow a non-monotonic or inverted U-shaped trajectory where positive effects at lower to moderate “doses” might turn negative at higher “doses” (87). The research into the “negative effects” needs to make a clear differentiation, mostly

lacking in previous research, between what constitutes “negative effects” *resulting from* vs. difficult/challenging experiences which might arise *during* mindfulness practice. This research also needs to be better formulated conceptually, as currently it is heavily culturally relative/biased in terms of what constitutes a “positive” vs. “negative” effect.

Mindfulness developed through the formal practice extends to all aspects of one’s life, resulting in greater enjoyment of hobbies, enhancement of inter-personal interactions, and pro-social engagement. The latter will support social cohesion in the times when cooperation is essential, and potentially reduce engagement in conspiratorial and otherwise antagonizing approaches as a way of coping with the disruption posed by the pandemic to what once was the normal order. Hence, the research into the effects of mindfulness practice upon the individuals should extend to understanding its effects on groups and societies at the time of extreme challenge. Schlosser and Bond (88) have observed positive effects of an intervention incorporating elements of different mindfulness-based approaches on team cohesion, team values, and willingness to support each other in a crew of six astronauts during training in isolation over a two-week period.

## CONCLUSION

Mindfulness-based approaches appear well-suited to deal with the challenges presented by the time of unrepresented uncertainty, change, and loss, which can take many forms in the context of COVID-19 pandemic. Mindfulness practice facilitates acceptance of the uncomfortable, difficult, and painful experiences, allowing them to simply be, feeling them as they are without judgement, being present with them until we are ready to let go, and thereby opening ourselves to new experiential and behavioral possibilities. Mindfulness as a way of being exemplifies an approach to life captured by the American poet Robert Frost: “The best way out is always through.” And it is our thesis that it is.

## DATA AVAILABILITY STATEMENT

The original contributions generated for this study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

## AUTHOR CONTRIBUTIONS

EA, RP, and VK contributed to the conception of the manuscript and its overall structure. KS contributed to manuscript preparation. EA wrote the first draft of the manuscript and revised the manuscript for the final version. VK, RP, and KS provided feedback and contributed to the revision. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the reported surveys of the MBSR and MBCT instructors providing online mindfulness sessions to the NHS health

workers and the online providers of mindfulness-based content (including Headspace) were conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Clinical Psychology Services for Patients Hospitalized Due to COVID-19 During the Pandemic in Northern Italy: From Isolation to Rehabilitation

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The objective of this paper is to describe the organization and modality of provision of clinical psychology services for those patients who had to be hospitalized due to COVID-19 during the pandemic in Northern Italy. The IRCCS Policlinico San Donato hospital in Milan was converted into a COVID-19 center in March 2020, and all the staff, including the Clinical Psychology Service Team, were diverted to assist these patients. A description is given of how the service was organized and the modalities which were utilized to assist the patients. Following the pertinent ministerial decrees, guidelines, and relevant literature, the patients were followed up through telehealth (via phone, smartphone, or tablet with audio or audio-visual calls). A COVID-19 rehabilitation unit was later opened in April 2020, where all patients were seen and followed up by the Clinical Psychology team, the last patient being discharged at the end of June. Details are given about the type of services provided during the hospitalization at the different points in time. At admittance and subsequent isolation, patients indicated by the medical and nursing staff, and those who specifically requested it, were given psychological support. Patients transferred to the COVID-19 rehabilitation unit were all evaluated for anxiety, depression, posttraumatic stress disorder, and sleep disorders both on admission and at discharge when possible.

**Keywords:** COVID-19, clinical psychology, telehealth, anxiety, depression, PTSD, sleep disorders, rehabilitation

## INTRODUCTION: THE OUTBREAK OF COVID-19 IN NORTHERN ITALY

The official date of the start of the outbreak of COVID-19 in Italy was the 31st of January 2020. This followed the arrival of two Chinese visitors on a flight from Wuhan to Milan Malpensa Airport on the 23rd of January, who tested positive in a central hotel in Rome. The first Italian patient confirmed with COVID-19 (patient 1) was a 38-year-old man admitted to the hospital in Codogno, Lombardy, on the 21st of February. After that, in <1 week there was a surprising increase in the number of cases in Italy, which put the Italian health service under considerable

strain, leading to the discovery of cases in various bordering regions and autonomous provinces of northern Italy (Carinci, 2020).

Following these events, many hospitals in northern Italy were converted into COVID-19 centers to deal with the emergency. On the 9th of March, it was communicated that also the IRCCS Policlinico San Donato would become a COVID-19 center and that all the staff, including the Clinical Psychology Service Team, would need to be diverted to assist this population. This caused considerable strain on the team, which had to quickly get organized to provide psychological assistance to a new population by utilizing new modalities. There was the additional stress of finding oneself in the same situation of the patients and the families themselves (The British Psychological Society, 2021), which was handled by holding daily remote meetings. During the peak of the pandemic, 283 hospital beds were made available for COVID-19 patients in our institute, and a total of 632 COVID-19 patients were admitted to our center, until the 30th of April. After that date, some patients were followed remotely after their discharge if required and but no further COVID-19 patients were admitted.

## PSYCHOLOGICAL FACTORS ASSOCIATED WITH HOSPITALIZATION OF COVID-19 PATIENTS

In the COVID-19 Prevention and Treatment Manual 2020a, it is reported that in isolation wards about 48% of confirmed COVID-19 patients experience psychological stress during initial admission.

The organization of health care for COVID-19 patients must necessarily include mental health care in a timely and urgent manner (Bao et al., 2020; Carvalho et al., 2020; Jiang et al., 2020; Onyeaka et al., 2020; Xiang et al., 2020).

Specific attention needs to be given to the older population, who are considered more vulnerable and more limited in regard to technological access and to remote care (Yang et al., 2020).

In fact, anxiety, and sleep disturbances have been shown to increase significantly following isolation hospital-based treatment. However, preliminary findings indicate that asymptotic muscle relaxation training, also conducted remotely, can be used to alleviate anxiety and improve sleep quality of patients with COVID-19 (Liu et al., 2020a).

In this study based in China, quality of life, anxiety, and depression were specifically assessed in the rehabilitation setting, and both quality of life and anxiety improved after a 6-week program (Liu et al., 2020b) in which the following interventions were carried out: respiratory muscle training, cough exercise, diaphragmatic training, stretching exercise, and home exercise.

Practitioners working in respiratory rehabilitation can also deal with reducing anxiety and depression in patients who experience symptoms of deliriousness, anger, fear, dysthymia, insomnia, panic attacks, or sense of abandonment during isolation and to monitor and improve the quality of life as much as possible. In addition, it is important to monitor the possibility of non-collaboration and non-adherence to

treatment (Vitacca et al., 2020; Zhou et al., 2020). From our clinical experience, non-adherence to treatment in hospital may occur because the patients are not aware of the effects of the treatment, because of extreme fatigue and because of severe psychological distress. Psychologists can help patients understand the importance of their treatment and provide support and indications for relaxation.

## NATIONAL AND INTERNATIONAL GUIDELINES AND RECOMMENDATIONS ABOUT PSYCHOLOGICAL SUPPORT DURING THE COVID-19 PANDEMIC

As a consequence of the pandemic, a series of decrees were issued by the President of the Council of Ministers in Italy (*Presidente del Consiglio dei Ministri - PDCM*) 2020b. In particular, on the 8th of March 2020 a decree was issued (PCDM, 2020) in which it was specified that in order to “counter and contain the spread of the COVID-19 virus,” “movements are authorized only if motivated by work needs or situations of need, that is displacement for health reasons.” It was highlighted that in all possible cases, “remote connection modalities with particular reference to public and community health and public utility services” must be adopted, to find alternative ways to proceed rather than physically moving people between locations.

Interim guidelines that addressed the use of personal protective equipment with coronavirus disease (COVID-19) and for operating during periods of severe shortages (World Health Organization, 2020), indicated that all bedside contact between health workers and COVID-19 patients should be restricted to only staff providing direct care, and that even this contact should be minimized and carefully planned. The advice to psychologists with respect to COVID-19 issued by the National Council of the Order of Psychologists (*Consiglio Nazionale Ordine Psicologi - CNOP*) (Consiglio Nazionale Ordine Psicologi, 2020) recommended that consultancies and therapies take place remotely when faced with clear epidemiological risk factors. The relevant regional order of psychologists recommended that the guidelines specified in the ministerial decree issued on the 8th of March should also be followed by psychologists in relation to organizing their work (Ordine Degli Psicologi Della Lombardia, 2020).

Further, international research and guidance papers recommended that psychological services should be delivered remotely, online, and/or over the telephone (Carvalho et al., 2020; Jiang et al., 2020; Liu et al., 2020c; Wind et al., 2020; Wright and Caudill, 2020; Xiang et al., 2020; Zhou et al., 2020). Nonessential staff, such as psychiatrists, psychologists, and social workers, were strongly discouraged from entering isolation wards for COVID-19 patients to observe the strict infection measures required by the pandemic (Duan and Zhu, 2020). It was suggested that patients should be guided to complete relevant questionnaires via their mobile phones 2020a.

In the recommendations relating to respiratory rehabilitation, it was indicated that psychological support is also important at the time of hospitalization (Brugliera et al., 2020; Xiao et al.,

2020). Further, rehabilitation programs for those patients who have been isolated should be conducted remotely with telehealth systems, in order to avoid the spread of infection (Vitacca et al., 2020; Zhou et al., 2020).

## ORGANIZATION AND MODALITY OF DELIVERY OF CLINICAL PSYCHOLOGY SERVICES

The rapid evolution of the situation in Northern Italy did not allow the possibility of structuring an intervention plan. In fact, before our institute was converted to a COVID-19 center in 2020, all of the Clinical Psychology Service staff were exposed to the virus without any personal protective equipment, having been in the presence of patients who were later diagnosed as having a positive diagnosis. All team members tested negative at the COVID-19 screening. However, in May, after a period of quarantine that followed this initial exposure, one psychologist's results indicated the presence of virus antibodies (but not the virus itself).

In order to establish how to proceed, a literature review was carried out. The pertinent ministerial decrees and indications from the regional order of psychologists were consulted, which will be described in detail in the following paragraphs. Operative instructions were drafted based on the decrees and guidelines and inserted in the official system of the hospital. These were automatically forwarded to all the staff of the hospital via e-mail, initially to provide guidance for the care of patients hospitalized for acute admissions. These were subsequently also applied for patients in rehabilitation following the opening of the COVID-19 Rehabilitation Unit on the 6th of April 2020.

In both cases, the operative instructions describe the expected psychological pathway for patients hospitalized in the various departments and therefore urgently requiring psychological crisis intervention (Jiang et al., 2020; Parolin et al., 2020).

## MODALITIES OF DELIVERY OF PSYCHOLOGICAL SUPPORT IN THE VARIOUS OPERATIVE UNITS AT THE IRCCS POLICLINICO SAN DONATO HOSPITAL

Taking into consideration all guidelines and recommendations, all clinical psychology services were organized online and/or via telephone. In those cases when patients did not own a smartphone or mobile phone, arrangements were made with staff to use the departmental telephone or tablet.

### Patients in Isolation and Intensive Care Unit

During the pandemic, more than 283 hospital beds (out of which 28 were intensive care beds) were dedicated to COVID-19 patients. For those patients who were in isolation and hospitalized in the intensive care unit. Although psychological support was provided for patients in the intensive care unit, no

psychometric evaluations were carried out, in order to avoid the risk of contributing further to their distress. Due to the large number of patients hospitalized, it was not possible to contact all of them to enquire whether or not they required psychological support.

The main route of referrals to the Clinical Psychology Service was through the medical and nursing staff, who alerted other colleagues via e-mail, phone, and word of mouth that the service was available remotely when required. A WhatsApp message was also circulated, instructing the medical staff on the procedure for referring patients.

The medical and nursing staff could refer the patients and their relatives by calling the service's fixed line from 8 a.m. to 8 p.m. (7 days a week), by writing an e-mail, or by messaging or calling the Clinical Psychology Service team mobile phone numbers.

The following information was requested when referrals were made: first and last name of the patient, their age, a brief description of their medical situation, the telephone number on which the patient could be contacted (possibly specifying if it is a smartphone or a normal phone), the operative unit in which the patient was hospitalized, and the phone contact of the referring physician and the head nurse of the operative unit.

During this phase, the type of psychological intervention was based upon the evaluation which was carried out during the first session, taking into consideration the presence of psychological distress (including anxiety, depression, and sleep disturbance), the patients' psychosocial situation, and the support they currently feel they had. All the questionnaires utilized have cutoffs which indicate the level of distress. When patients reported moderate or severe distress, this was explored and the patients were closely monitored, on a daily basis. If the distress was absent or mild, the patients were contacted once or twice a week.

A total of 21 patients were seen (9 females and 12 males, average age 67 years, ages ranging from 31 to 84 years) from the 9th of March to the 6th of June. The average duration of hospitalization was 25 days, and 189 sessions were provided, which lasted approximately 20 min each. 13 family members were also supported, and 2 patients were also provided psychological support after discharge. One patient who was referred to the Clinical Psychology Service refused the offer of support.

### Patients in COVID-19 Rehabilitation Unit

When it comes to performing assessments in COVID-19 rehabilitations, it has been recommended that questionnaires which can be compiled quickly by patients, and which can help to quickly identify the type of psychological dysfunction should be utilized (Zhao et al., 2020). In addition, patients should have access to psychological support also through a hotline (Zhao et al., 2020). Further, it is recommended to provide patients counseling sessions, psychological support, and cognitive training as required (Brugliera et al., 2020).

When the patients were transferred to the rehabilitation unit, they were in a more stable condition, and this allowed for a more thorough psychological screening with the utilization of psychometric tests and a psychosocial assessment. The average

length of hospitalization in this unit was of 18 days (with a minimum of 8 days and a maximum of 39 days).

The patients were identified upon hospitalization in the unit by the communication of the medical staff to the clinical psychology service staff and through the daily consultation of the GALILEO, a management system for coordinated activities to efficiently direct and govern patient-centered hospital processes. The same information was obtained for patients in isolation if this had not previously been gathered.

For each patient, a minimum of 3 sessions were programmed during their hospitalization of about 20 days; if the patient stayed for <10 days, at least 2 sessions were provided. At the end of each session, an activity report file which included the date, the starting time of the end time of the session, the duration in minutes, and the qualitative description of the type of intervention was compiled by the staff of the service on an online excel database.

During the first interview, a general assessment of the patients' psychological status was carried out as well as the appropriateness of administering psychometric tests.

In the second session, if the psychosocial questionnaire could be administered to the patient, the assessment was carried out remotely. If, for some reason, it was not possible to administer the psychosocial questionnaire to the patient, a psychological support session was provided. Some reasons which did not allow patients to be tested were the patients feeling too weak and tired, being completely deaf, severe cognitive impairment, and when patients refused to proceed.

When it comes to the third interview, if the hospitalization lasted <15 days, the psychometric tests were not re-administered (because most tests assess psychological functioning on a period of 2 weeks). If the patients' hospital admission lasted for 15 days or more, the psychometric tests were re-administered [anxiety (GAD-7), depression (PHQ-9), post-traumatic stress disorder (IES-R), and insomnia (ISI)], and the evolution of the psychological situation was discussed with patients.

For all patients entering the rehabilitation unit, two reports were drawn up: an initial psychological report, which included all the results from the psychometric tests, and the task report form, where all the sessions and the number of minutes were indicated. For patients who were hospitalized for 15 days or longer, a final psychological report was drafted, where the evolution of the psychological condition was described. When patients required and/or requested psychological support also after discharge, it was provided. All the documentation was sent via e-mail to the head of the COVID-19 Rehabilitation Unit via the hospital e-mail, to be included in the patients' medical records, and stored digitally in the area of the server dedicated to the service of Clinical Psychology.

A total of 37 patients were admitted to the COVID-19 Rehabilitation unit, and 35 were evaluated and provided support (18 females and 17 males, average age 75, age ranging from 52 to 92) from the 8th of April to the 30th of June. The remaining 2 patients could not be supported because one was completely deaf and the other one had severe Alzheimer's disease. Five of the patients who were supported during isolation were subsequently

moved to rehabilitation. A total of 108 sessions were provided which lasted on average 20 min.

## Psychosocial Assessments Utilized in COVID-19 Rehabilitation

The following questionnaires which have been validated and freely distributed in Italy are suggested in order to monitor anxiety and depression: the Patient Health Questionnaire-9 (PHQ-9) (Spitzer et al., 1999; Cannon et al., 2007; Stafford et al., 2007; Kroenke et al., 2009) and the GAD-7-General Anxiety Disorder-7 (Spitzer et al., 2006; Esser et al., 2018). As specified in the previous paragraphs, it is extremely important to monitor anxiety and depression in hospitalized patients with COVID-19. The following short questionnaires may be particularly useful for measuring a range of psychological symptoms in this population.

The Impact of Event Scale (IES) (Spitzer et al., 2006; Esser et al., 2018) has been previously utilized to assess levels of posttraumatic stress disorder in patients infected with severe coronaviruses and who were also hospitalized. The initial assessment was carried out through a psychosocial questionnaire that evaluated the general patient history including demographic and social variables: marital status, presence/absence of children, culture of origin, education level, occupation status, and religion.

In regard to assessment of social support and loneliness, patients were asked if they had any close relationships, the quality of those relationships, and if they were receiving adequate support.

## Psychometric Testing

The following validated tests were administered after the psychosocial assessment.

- The Fagerström test (Heatherton et al., 1991) is a self-administered test that evaluates the current dependence on nicotine.
- The Morisky, Green, and Levine Adherence Scale (MGL) (Morisky et al., 1986) is the most widely used on adherence to drug therapy.
- The Satisfaction with Life Scale (SWLS) (Broadbent et al., 2006) measures the overall cognitive assessment of life satisfaction experienced by the patient.
- The Patient Health Questionnaire - 9 (PHQ-9): (c Kroenke et al., 2001) is a short psychological screening tool designed to measure symptoms of depression in primary care facilities.
- The Generalized Anxiety Disorder (GAD-7): (Kroenke et al., 2007) is a screening tool for generalized anxiety disorder in clinical practice and research. In addition, it provides a measure of severity and is linked to the criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV).
- The EuroQoL-Visual Analog Scale (VAS): (EuroQoL Group, 1990) is the second part of the EuroQoL-5D questionnaire, a standardized tool that measures the health of respondents and their quality of life and consists of a VAS of 20 cm, graphically represented as a graduated thermometer, on which the patient indicates the best (score=0) or worst (score=100) possible state of health.



- The QoL-VAS: (Moons et al., 2006) consists of a visual analog scale of 20 cm, graphically represented as a graduated thermometer, on which the patient indicates the best (score=100) or the worst (score=0) about the perception of own quality of life.
- The Impact of Event Scale (IES-R): (Weiss et al., 1997) is a self-report measure (for DSM-IV) that assesses subjective distress caused by traumatic events.
- The Insomnia Severity Index (ISI): (Bastien et al., 2001; Castronovo et al., 2016) is a self-report questionnaire assessing the nature, severity, and impact of insomnia.

If the cutoffs of the various tests indicated the presence of anxiety, depression, PTSD, and sleep disturbances and if there was a particular indication of social isolation and/or also a lack of awareness and adequate coping, the medical staff were alerted. These elements guided the psychologist to plan additional sessions as needed.

## DISCUSSION AND CONCLUSIONS

In this perspective paper, the organization of clinical psychology services for COVID-19 patients who were severe enough to necessitate hospitalization, in a red zone, was described. The progression of the pandemic was extremely rapid and unexpected in Northern Italy, and in that period, there was a lot of uncertainty about the characteristics of the virus. This caused a lot of difficulty when it came to the determination of the modality of the provision of the clinical psychology service and on the type of intervention which was required. Another peculiar characteristic, which varied from the routine situation, was that all the members of the staff were exposed to the same situation in which the patients were, even though none of them developed any severe symptoms.

The first cases which were referred to the service included young people who were affected with a Cytokine Storm. As the isolation departments were being organized, the medical staff requested our intervention. In the beginning, there was a lot of uncertainty about whether to proceed remotely or in person.

Following consultation of all the decrees, recommendations, and pertinent literature, there was no doubt that the interventions needed to be provided remotely, to minimize, as much as possible, the spread of the virus during the peak.

As indicated in the literature described in the previous paragraphs, in the absence of the option of in-person contact, that remote modalities remote psychological support is highly effective when it comes to the assessment and monitoring of the hospitalized patients and also the delivery of psychological support. Patients who had to wear breathing caskets because of a very low saturation confirmed that it was easier to communicate remotely, because they had the possibility to put earphones inside the casket. Face-to-face communication was extremely

difficult also because the healthcare providers who were present had to wear a considerable amount of protective gear, making communication even more difficult.

During the sessions, the patients were helped to become aware of their emotions and express their distress (also with the help of the patient reported outcomes) and they were taught to relax through very basic breathing exercises. Their psychological status was monitored, and if at discharge they still reported experiencing distress, they were supported also during the follow up period. In agreement with the literature we cited, we therefore recommend providing remote psychological support to the patients and their families.

In order to monitor the well-being of Clinical Psychology Staff, a remote “check-up” was organized twice a day, once in the morning and once in the evening. Temperature and symptoms were checked, and support was provided also within the team, as required, to increase resiliency during this highly stressful period marked by significant uncertainty. In conclusion, even though patients in rehabilitation were all screened and supported, and all referred patients were contacted, it could be possible due to the highly demanding and unexpected circumstances that not all isolated patients who required psychological support were referred to and contacted by the Clinical Psychology Service.

We recommend that in future, it would be useful to identify medical and psychosocial characteristics that could help the clinical psychology service to recognize suitable patients independently, without the need for direct referrals by medical staff. Ensuring that patient mobile phone numbers are reliably recorded on their medical chart would facilitate this. Based on our experience, we suggest that indicators could be based on certain medical and psychosocial indicators (such as preexisting psychiatric or psychological conditions, possibility of a bad prognosis, etc.). Such measures as these may increase the efficiency and expediency of the provision of clinical psychology services in the midst of pandemic conditions.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

## AUTHOR CONTRIBUTIONS

EC, SP, VF, and EB made substantial contributions in the conception, writing, and final approval of the article. BB reviewed the final version of the article.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# The Italians in the Time of Coronavirus: Psychosocial Aspects of the Unexpected COVID-19 Pandemic

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**Background:** The COVID-19 pandemic is a worldwide public health emergency that forced the Italian Government to deliberate unprecedented actions, including quarantine, with a relevant impact on the population. The present study is one of the first Italian nationwide survey within the first period of the COVID-19 outbreak aimed to understand the social and psychological impact of the COVID-19 outbreak.

**Methods:** An online survey collected information on sociodemographic data, history of direct or indirect contact with COVID-19, and other information concerning the COVID-19 emergency. The General Psychological Well-Being Index and a modified version of the PTSD Checklist for DSM-5, focused on the COVID-19 experience, assessed the respondents' general psychological condition.

**Results:** Of 1,639 respondents equally distributed in the Italian territory, 5.1% reported PTSD symptomatology, and 48.2% evidenced lower psychological well-being linked to COVID-19 diffusion. Lower psychological well-being was significantly higher in women, younger than 50 years, and with health risk factors. Lower psychological well-being was also detected in individuals who did not know if they were infected, who have had direct exposure or were uncertain about their exposure to COVID-19, or who knew infected people. Regarding the social and behavioral consequences, respondents perceived worsening in demographic, economic, social, and relational conditions. Moreover, they reported increased film viewing, cookhouse time, social media use, and decreased physical activity.

**Conclusion:** The COVID-19 pandemic appears to be a risk factor for psychological diseases in the Italian population, as previously reported in the Chinese people. About half of the respondents reported a significant psychological impact. Moreover, we confirmed the role of restraining measures that led to modify lifestyles, social perception, and confidence in the institutions. These results underline the need for further studies aimed to develop psychological interventions to minimize the consequences of the COVID-19 pandemic.

**Keywords:** COVID-19, pandemic, coronavirus, psychological aspects, PGWBI, psychological well-being, PTSD

## INTRODUCTION

Since December 2019, several world places have gradually experienced an outbreak of pneumonia epidemic caused by the 2019 novel coronavirus (2019-nCoV, later named SARS-CoV-2, and then COVID-19) (1). The COVID-19 outbreak was defined as a pandemic by the World Health Organization (WHO) (1). The governments of many states immediately focused attention on the best strategies to reduce the virus diffusion and the number of victims.

In Italy, since the first case of COVID-19 (February 20, 2020), a rapid spread of the contagions was reported in the first weeks of March. This condition resulted in the Italian Government's deliberation of unprecedented actions aimed to reduce the diffusion of the virus, in line with the measures already adopted in China. Since March 10, a lockdown was requested for the Italian population. This measure included avoiding gathering and requiring to maintain the social distance of at least 1 m, limiting the number of people in public places, going out to work only if the physical presence was essential, and going out of one's own home if it was strictly necessary. Moreover, the blocking of all unnecessary economic activities (e.g., gyms, restaurants, and beauty centers) was imposed. For the first time since the end of the Second World War, the Italian population is facing a reduction in freedom of movement and a severe economic and job crisis that adds to the uncertainty linked to the increase in COVID-19 cases and victims. As of March 30, 2020, the pandemic had caused 12,428 deaths out of 105,792 confirmed cases in Italy (2). Despite the obvious benefits of the extreme social distancing measures adopted in countries such as Italy, the spread of COVID-19 is still unstoppable worldwide.

One of the main features that impact psychological well-being is the restriction of freedom of movement connected to social isolation. Previous studies on several epidemics, such as HIV/AIDS diffusion, the SARS and H1N1 pandemic, the Ebola virus, and the Zika virus, have underlined psychological consequences not only on individuals affected by these diseases but also on the non-infected community because they involve different levels of social life (3–6). Hence, both the sudden outbreak of a new and unknown virus and the measures adopted to decrease its spread have had a strong impact on the quality of life and the population's psychological well-being. Accordingly, a recent review suggested that the psychological impact of quarantine and social distancing is wide ranging, substantial, and can be long lasting. It includes anxiety and mood disorders, psychological distress and post-traumatic symptomatology, sleep disturbance, and other psychopathological conditions that negatively impact general psychological well-being and quality of life (7). However, although there are similarities with previous epidemic outbreaks and other diseases, the COVID-19 pandemic has some peculiarities, such as its rapid global spread, its high social and mass-media impact, the high uncertainty due to its origin and its consequences on global health, and the extreme measures taken on a large scale, which make it different from previous cases and underline its scientific relevance in understanding the impact of such kind of event, also on a psychological level.

Starting from the first weeks and over time, some studies have proposed investigating the psychological impact of the COVID-19 pandemic in the first phases of its spread [e.g., 5, 6, 8]. However, most of the first research focused on identifying the epidemiology and clinical characteristics of patients infected by the virus (8, 9) and the challenges for the health systems and the national and international institutions (10). More recent studies analyzed the psychological effects of this emergency in more detail in Italian samples (11–13).

The present study is part of a first nationwide, large-scale survey conducted in the Italian population within the first and more tumultuous weeks of the COVID-19 outbreak (March 2020), focused on assessing the general psychological well-being of the Italian population and the perceptions about the impact of this experience on the Italians' life. Our goal is to provide a photograph of the Italian condition in the first weeks of the restrictive measures related to the period immediately following the promulgation of the "I stay home" decree determined by the broad and severe diffusion of the COVID-19 in Italy.

## METHODS

### Setting and Participants

A cross-sectional design to assess the public response during the epidemic of COVID-19 was adopted. We used an anonymous online survey disseminated to platforms and social media. Due to the current research aim, being at least 18 years old was the only inclusion criterion. The 97.03% of the total respondents (1,689) that started the questionnaires completed the whole survey (1,639) and were considered for the statistical analysis. The main demographic characteristics of the sample are shown in **Table 1**.

### Procedure and Survey Development

As the Italian Government recommended to minimize face-to-face interactions, participants completed the questionnaires through an online survey platform (KoboToolbox). Expedited ethics approval was obtained from the Ethics Committee of the Department of Dynamic and Clinical Psychology of "Sapienza" University of Rome (protocol number: 0000266). The study conformed to the principles of the Declaration of Helsinki. All respondents provided electronic informed consent before starting the investigation. Data refers to the period from March 18 to 25, 2020. The structured survey consisted of questions that covered several areas and took ~30 min to complete. After a demographic questionnaire, participants responded to items assessing the knowledge and perceptions of COVID-19 diffusion and the government measures adopted to contain it; then, questionnaires to evaluate psychological aspects were administered. Participants could withdraw from the survey without providing any justification, and no data were saved. Only data with a complete set of responses were considered.

### Outcomes

Sociodemographic data were collected on gender, age, education, current location, employment status, and the number of usual day interactions. The social impact of COVID-19 was measured,



**TABLE 1** | Demographic characteristics of the sample and information about COVID-19.

<i>n</i> (%)	Overall sample ( <i>N</i> = 1,639)	High general psychological well-being ( <i>N</i> = 947)	Low general psychological well-being ( <i>N</i> = 692)	$\chi^2$	<i>P</i>
Gender				73.96	0.0001
Man	394 (24.0)	301 (76.4)	93 (23.6)		
Woman	1.242 (75.8)	644 (51.9)	598 (48.1)		
Other	3 (0.2)	2 (66.7)	1 (33.3)		
Age				8.23	0.01
18–29 years old	1.088 (66.4)	617 (56.7)	471 (43.3)		
30–49 years old	353 (21.5)	197 (55.8)	156 (44.2)		
>50 years old	198 (12.1)	133(67.2)	65 (32.8)		
Education				13.72	0.003
Until middle school	71 (4.3)	48 (67.7)	23 (32.4)		
High school	808 (49.3)	452 (55.9)	356 (44.1)		
Graduate and post-graduate					
Health care	221 (13.5)	149 (67.4)	72 (32.6)		
Other	539 (32.9)	298 (55.3)	241 (44.7)		
Occupation				6.22	0.18
Student	764 (46.6)	425 (55.6)	339 (44.4)		
Employed	506 (30.9)	306 (60.5)	200 (39.5)		
Unemployed	187 (11.4)	101 (54.0)	86 (46.0)		
Self-employed	155 (9.5)	98 (63.2)	57 (36.8)		
Retired	27 (1.6)	17 (63.0)	10 (37.0)		
Health risk factor*				25.03	0.0001
No	1.219 (74.4)	748 (61.4)	471 (38.6)		
Yes	420 (25.6)	199 (47.4)	221 (52.6)		
Italian territorial areas				1.48	0.47
North Italy	496 (30.3)	282 (56.9)	214 (43.1)		
Center Italy	535 (32.6)	302 (56.4)	233 (43.6)		
South Italy	608 (37.1)	363 (59.7)	245 (40.3)		
Average number of inhabitants, <i>n</i> (%)				3.81	0.28
<2,000	85 (5.2)	49 (57.6)	36 (42.4)		
2,000–10,000	335 (20.4)	178 (53.1)	157 (46.9)		
10,000–100,000	644 (39.3)	379 (58.9)	265 (41.1)		
> 100,000	575 (35.1)	341 (59.3)	234 (40.7)		
Number of usual daily interaction (no. of people)				7.63	0.04
<10	663 (40.5)	359 (54.1)	304 (45.9)		
10–50	787 (48.9)	477 (60.6)	310 (39.4)		
51–100	147 (9.0)	83 (56.5)	64 (43.5)		
> 100	42 (2.6)	28 (66.7)	14 (33.3)		
Quarantine experience				4.62	0.59
Alone	166 (10.1)	98 (58.7)	69 (41.3)		
Family members	1.153 (70.4)	666 (57.8)	487 (42.2)		
Roommates	97 (5.9)	46 (52.3)	42 (47.7)		
Partner	217 (13.2)	127 (58.5)	90 (41.5)		
Co-workers	6 (0.4)	2 (33.3)	4 (66.7)		
Occupational status during COVID-19 emergency				13.40	0.009
Unemployed	787 (48.0)	436 (55.4)	351 (44.6)		
Keep on working out	166 (10.1)	98 (59.0)	68 (41.0)		
Smart-working	289 (17.6)	175 (60.6)	114 (39.4)		
Not-working					
Economic problem	150 (9.2)	75 (50.0)	75 (50.0)		

(Continued)

TABLE 1 | Continued

<i>n</i> (%)	Overall sample ( <i>N</i> = 1,639)	High general psychological well-being ( <i>N</i> = 947)	Low general psychological well-being ( <i>N</i> = 692)	$\chi^2$	<i>P</i>
No economic problem	247 (15.1)	163 (66.0)	84 (34.0)	7.57	0.02
Infected by COVID-19					
Yes	6 (0.4)	2 (33.3)	4 (66.7)		
No	1.189 (72.5)	710 (59.7)	479 (40.3)	11.93	0.002
Do not know	444 (27.1)	235 (52.9)	209 (47.1)		
Direct contact with people infected by COVID-19					
Yes	32 (2.0)	12 (37.5)	20 (62.5)	12.99	0.01
No	991 (60.4)	601 (60.6)	390 (39.4)		
Do not know	616 (37.6)	334 (54.2)	282 (45.8)		
Knowledge of people infected by COVID-19				6.97	0.13
Acquaintance	231 (14.1)	132 (57.1)	99 (42.9)		
Co-worker	33 (2.0)	19 (57.6)	14 (42.4)		
Friend	87 (5.3)	37 (42.5)	50 (57.5)	6.75	0.08
Family	83 (2.6)	19 (44.2)	24 (55.8)		
No	1.245 (76.0)	740 (59.4)	505 (40.6)		
Knowledge of people in ICU for COVID-19				3.62	0.30
Acquaintance	87 (5.3)	49 (56.3)	38 (43.7)		
Co-worker	9 (0.5)	4 (44.4)	5 (55.6)		
Friend	29 (1.8)	11 (37.9)	18 (62.1)	15.18	0.0005
Family	12 (0.7)	5 (41.7)	7 (58.3)		
No	1.502 (92.0)	878 (58.5)	624 (41.5)		
Knowledge of people died for COVID-19				3.62	0.30
Acquaintance	68 (4.1)	34 (50.0)	34 (50.0)		
Co-worker	-	-	-		
Friend	8 (0.5)	2 (25.0)	6 (75.0)	15.18	0.0005
Family	10 (0.6)	4 (40.0)	6 (60.0)		
No	1.553 (95.8)	907 (58.4)	646 (41.6)		
Awareness of the emergency state				15.18	0.0005
Before the "I Stay at home" decree	1.332 (81.3)	756 (56.8)	576 (43.2)		
After the "I Stay at home" decree	301 (18.4)	187 (62.1)	114 (37.9)		
We are not in emergency state	6 (0.4)	4 (66.7)	2 (33.3)	15.18	0.0005
Confidence in the measures adopted by the Italian Government					
Yes	962 (58.7)	594 (61.7)	368 (38.3)		
No	448 (23.3)	236 (52.7)	212 (47.3)	15.18	0.0005
Do not know	229 (14.0)	117 (51.1)	112 (48.9)		

The analyses refer to the comparison between people with high and low general psychological well-being.

\*Risk factors for the COVID-19 include hypertension, diabetes, cardiovascular and pulmonary diseases, immunodepression, oncological pathologies, kidney disorders, or other medical conditions also in comorbidities.

including quarantine experience, level of confidence in State Institution, information about COVID-19, the trend of new cases and deaths, and previsions on the potential end of the infection. Respondents were required to indicate their source of information and their confidence with it. Concerns about COVID-19 variables included self and other family members that had or could contract the COVID-19 virus. The psychological impact of COVID-19 was measured using the *Psychological General Well-Being questionnaire (PGWB)* (14) and the *Post-Traumatic Stress Disorder Related to COVID-19*.

The *Psychological General Well-Being questionnaire (PGWB)* (14) was adopted to measure subjective general psychological well-being. The PGWB consists of 22 items on six-point Likert scales, divided into six dimensions: Anxiety, Depressed mood, Positive well-being, Self-control, General health, and Vitality. A global score and measures for each dimension are calculated, with higher scores indicating greater well-being in subscales and global scores. In our study, scores higher than 60 indicate adequate psychological general well-being (15).

**TABLE 2** | Confidence of the responders on specific sources of information during the COVID-19 emergency.

<i>n</i> (%)	Extremely	Quite a bit	Indifferent	A little bit	Not at all
Italian government	485 (29.6)	810 (49.5)	125 (7.6)	176 (10.7)	43 (2.6)
Civil protection	666 (40.6)	739 (45.1)	111 (6.7)	105 (6.4)	18 (1.2)
General practitioner	64 (16.1)	553 (33.7)	476 (29.0)	185 (11.4)	161 (9.8)
Social media	67 (4.1)	378 (23.1)	331 (20.2)	87 (35.8)	272 (16.8)
Scientific journals	619 (37.8)	591 (36.1)	264 (16.1)	68 (4.1)	97 (5.9)

**TABLE 3** | Perception of some social conditions by responders during the COVID-19 emergency.

<i>n</i> (%)	Significantly improved	Moderately improved	Neither improved or worst	Moderately worst	Significantly worst	Do not know
Environmental condition	620 (37.8)	624 (38.1)	142 (8.7)	66 (4.0)	79 (4.8)	108 (6.6)
Cultural condition	22 (1.3)	245 (15.0)	473 (28.9)	384 (23.5)	337 (20.6)	178 (10.7)
Demographic condition	14 (0.9)	46 (2.8)	289 (17.6)	395 (24.1)	508 (31.0)	387 (23.6)
Economic condition	21 (1.3)	13 (0.8)	34 (2.1)	127 (7.7)	1,345 (82.6)	99 (6.0)
Political condition	31 (1.9)	218 (13.4)	466 (28.4)	307 (18.7)	294 (17.9)	323 (19.7)
Social condition	34 (2.1)	191 (11.6)	199 (12.1)	418 (25.5)	683 (41.7)	114 (7.0)
Relationship status	52 (3.2)	222 (13.5)	244 (14.9)	377 (23.0)	641 (39.1)	103 (6.3)
Sense of identity	67 (4.1)	239 (14.6)	376 (22.9)	257 (15.7)	306 (18.7)	394 (24.0)

The *Post-Traumatic Stress Disorder Related to COVID-19* (COVID-19-PTSD; Modified version of PTSD Checklist for DSM-5; PCL-5) (16, 17) is a self-report measure designed *ad hoc* to assess specific symptoms consequent to the COVID-19, similar to PTSD symptoms, according to the DSM-5 criteria. The questionnaire includes 19 items structured in five-point Likert scales, from 0 (not at all) to 4 (extremely). To test the psychometric quality of this questionnaire, data were collected in an independent subsample ( $n = 300$ , 150 women; mean age:  $26.22 \pm 1.27$ ). The principal component analysis indicated one factorial structure, including 19 items that explain 49% of the variance. Then, confirmatory factor analysis confirmed a mono-factorial structure with 19 items with good model fits and adequate reliability (CFI = 0.80, SRMR = 0.06,  $\chi^2/df = 871.45$  with  $p < 0.001$ ; Cronbach's  $\alpha$ : 0.94). In this study, scores higher than the mean of the sample plus 1.5 standard deviations were indicative of higher PTSD symptomatology.

## Statistical Analysis

Descriptive statistics were calculated for sociodemographic characteristics, and social and psychological variables were collected. Prevalence data (number and percentage) for each dimension assessed were reported. The scores of the PWBI subscales and COVID-19-PTSD test were expressed as means and standard deviations. T-Student was used to compare our sample data with normative data. Chi-square test ( $\chi^2$ ) was used to compare the differences in prevalence between groups with high general psychological well-being and low general psychological well-being. Logistic regression and correlation models were performed to explore potential influence factors for psychological well-being and PTSD symptomatology during the COVID-19 epidemic. Odds ratio (OR) and 95% confidence

interval (95% CI) were obtained from logistic regression models.  $P$ -values of  $<0.05$  were considered statistically significant (two-tailed test). All data were analyzed using the Statistical Package for Social Sciences (SPSS) version 24.0 (IBM SPSS Statistics, New York, United States) and Statistica 10.0.

## RESULTS

### Demographic Characteristics

Sociodemographic characteristics are presented in **Table 1**.

One thousand six hundred and thirty-nine respondents completed the questionnaires (completion rate: 97.04%). The mean age of the respondents was 30.37 (SD: 12.14) years. The majority of the respondents were women (75.8%), aged from 19 to 30 years (66.4%), students (46.6%), or employees (30.9%). Respondents were equally distributed in Italian territorial areas, 30.3% in the North, 32.6% in the Center, and 37.1% in the South of Italy. Most respondents lived in a city with over 10,000 inhabitants (74.5%) and declared to generally have from 10 to 50 daily interactions with others (48.9%). In most cases, the quarantine experience was shared with members of the family (70.4%). The majority of the respondents reported that they had perceived the emergency state before the restrictive actions taken by the government with the "I stay at home" decree (81.3%).

Considering the history of contacts with confirmed and suspected cases of COVID-19, overall, 2.0% of the respondents have been in direct contact with an individual with suspected COVID-19; 8.3 and 5.2% reported, respectively, to know a person who was currently an inpatient in an intensive care unit or died because of the COVID-19 infection.

**TABLE 4** | Activity changes of the responders during the COVID-19 emergency.

<i>n</i> (%)	Significantly increased	Moderately increased	Unchanged	Moderately decreased	Significantly decreased
Book reading	267 (16.3)	387 (23.4)	823 (50.2)	49 (3.0)	116 (7.1)
Film viewing	624 (38.1)	536 (32.7)	386 (23.6)	48 (2.9)	45 (2.7)
Physical activity	186 (11.3)	280 (17.1)	448 (27.3)	253 (15.4)	472 (28.8)
Cookhouse time	429 (26.2)	547 (33.4)	33 (32.5)	66 (4.0)	64 (3.9)
Use of social media	652 (39.8)	514 (31.4)	402 (24.5)	31 (1.9)	40 (2.4)

## Social Aspects

The measures taken by the government were perceived by more than half of the respondents as adequate (58.7%) (see **Table 1**). Considering the confidence in the source of information about COVID-19, the respondents reported being fairly confident of health information available by Civil Protection (49.4%), government (49.4%), general practitioner (33.7%), and scientific journal (36.1%). Confidence in social media information (35.8%) was relatively low (see **Table 2**).

Regarding the social consequences of COVID-19 (see **Table 3**), the respondents perceived high improvement in the environmental condition (37.8%) and high worsening in demographic (31.0%), economic (82.6%), social (41.7%), and relationship (39.1%) conditions. Moreover, no relevant changes were perceived on identification (22.9%), politic (28.4%), and cultural (28.9%) conditions.

Considering changes in activity during the COVID-19 emergency, respondents reported an increase in film viewing (38.1%), cookhouse time (33.4%), use of social media (39.8%), and a decrease in physical activity (28.8%) (see **Table 4**).

## Psychological Aspects

The sample showed a lower mean than normative data in the PGWB questionnaire, considering all the subscales and total well-being, confirming low psychological well-being (see **Table 5**).

Overall, the prevalence of COVID-19-PTSD was 5.1%, with a mean total score of 19.88 (SD: 15.81), and the prevalence of lower psychological well-being was 48.2%, with a mean total well-being score of 62.77 (15.13). The prevalence of lower psychological well-being was significantly influenced by gender ( $X^2 = 73.96$ ;  $p < 0.0001$ ), age ( $X^2 = 8.23$ ;  $p < 0.01$ ), education ( $X^2 = 13.72$ ;  $p < 0.003$ ), health risk factors ( $X^2 = 25.03$ ;  $p < 0.0001$ ), number of usual daily interactions ( $X^2 = 7.63$ ;  $p = 0.04$ ), history of infection by COVID-19 ( $X^2 = 7.57$ ;  $p = 0.02$ ), direct contact with people infected by COVID-19 ( $X^2 = 11.93$ ;  $p = 0.002$ ), occupational status during the COVID-19 emergency ( $X^2 = 13.40$ ;  $p = 0.009$ ), knowledge of people infected by COVID-19 ( $X^2 = 12.99$ ;  $p = 0.01$ ), and confidence in the measures adopted by the government ( $X^2 = 15.18$ ;  $p = 0.0005$ ). All Chi-squared values are reported in **Table 1**.

Positive linear correlations were found between age and dimension of psychological well-being, except considering general health ( $p = 0.01$ ) and PTSD symptomatology related to COVID-19 ( $p = 0.02$ ) that reported negative correlations. Conversely, considering the number of days spent in quarantine, negative linear correlations were observed with psychological

**TABLE 5** | Comparisons between responders' results and normative data on PGWB.

	Survey responders	Normative data	<i>t</i>	<i>P</i>
<b>Psychological well-being, mean (SD)</b>				
Anxiety	62.35 (20.97)	72.80 (19.18)	14.46	0.0001
Depressed mood	79.06 (15.77)	83.35 (16.43)	7.43	0.0001
Positive well-being	44.55 (17.23)	62.67 (18.65)	28.18	0.0001
Self-control	69.83 (18.70)	80.27 (18.80)	15.52	0.0001
General health	70.37 (15.84)	75.87 (18.47)	8.94	0.0001
Vitality	58.29 (18.80)	68.48 (18.32)	15.29	0.0001
Total well-being	62.77 (15.13)	72.86 (15.56)	18.34	0.0001

well-being and a positive one with PTSD symptomatology related to the COVID-19. The correlational matrix is shown in **Table 6**.

Logistic regression models showed statistical differences (**Table 7**). Being a woman (OR = 3.00; 95% CI = 2.31–3.88), belonging to the age groups of 18–29 (OR = 1.56; 95% CI = 1.13–2.15) and 30–49 years (OR = 1.62; 95% CI = 1.12–2.33), with a high school degree (OR = 1.63; 95% CI = 1.19–2.23) or a bachelor degree in disciplines other than healthcare (OR = 1.6; 95% CI = 1.2–2.3), and with the presence of health risk factors (OR = 1.76; 95% CI = 1.41–2.20) represent higher risk conditions for experiencing low psychological well-being. Regarding the COVID-19 outcome role on psychological well-being, respondents who were uncertain about the COVID-19 infection (OR = 1.31; 95% CI = 1.05–1.64) or who had some contacts with individuals affected by the virus (OR = 2.6; 95% CI = 1.2–0.3) were more likely to report low psychological well-being, as well as people who knew someone infected by COVID-19 (OR = 1.32; 95% CI = 1.05–1.66) or who knew people who were hospitalized in intensive care units (OR = 1.38; 95% CI = 0.97–1.96) or dead people consequent of COVID-19 infection (OR = 1.61; 95% CI = 1.04–2.49). Finally, no confidence (OR = 1.45; 95% CI = 1.15–1.81) or uncertainty (OR = 1.54; 95% CI = 1.15–2.06) about the suitability of the measures adopted by the Italian Government impacted negatively on psychological well-being (see **Table 7**).

Concerning PTSD symptomatology, the previous results on PGWB on women (OR = 6.6; 95% CI = 2.4–18.1), health status (OR = 2.5; 95% CI = 1.6–3.9), uncertainty about the presence of COVID-19 infection (OR = 1.7; 95% CI = 1.1–2.7), having had direct contacts with people infected by COVID-19 (OR = 3.3; 95% CI = 1.1–1.9), knowing someone infected by COVID-19 (OR = 2.2; 95% CI = 1.4–3.4), or hospitalized in intensive care



**TABLE 6** | Pearson's *r* correlations between psychological dimensions of distress, age, and time spent in quarantine.

	Anxiety (PGWB)	Depression (PGWB)	Positive well-being (PGWB)	Self-control (PGWB)	General health (PGWB)	Vitality (PGWB)	Total well-being (PGWB)	PTSD symptoms
Age	0.05 <i>p</i> < 0.05	0.09 <i>p</i> < 0.0001*	0.06 <i>p</i> < 0.05	0.13 <i>p</i> < 0.0001	−0.10 <i>p</i> < 0.01	0.08 <i>p</i> < 0.0001	0.10 <i>p</i> < 0.01	−0.06 <i>p</i> < 0.05
Quarantine (no. of days)	−0.06 <i>p</i> < 0.01*	−0.06 <i>p</i> < 0.01*	−0.019 <i>p</i> < 0.4	−0.04 <i>p</i> = 0.09	−0.05 <i>p</i> = 0.07	−0.07 <i>p</i> < 0.01*	−0.06 <i>p</i> < 0.01*	0.08 <i>p</i> < 0.01*

\*Bonferroni adjusted *p* ≤ 0.02.

units (OR = 2.6; 95% CI = 1.4–4.7), or dead people consequent to the COVID-19 infection (OR = 2.3; 95% CI = 1.1–4.8), represent high risk factors to develop PTSD symptomatology (see **Table 7**).

## DISCUSSION

According to the results of this study, just a few weeks after the outbreak of the COVID-19 in Italy and a few days after the declaration of the restrictive measures, 5.1% of the respondents reported PTSD symptomatology linked to the COVID-19 diffusion, and 48.2% evidenced lower psychological well-being, characterized by anxiety and depressive symptoms, negative well-being, perception of loss control, less vitality, and lower general perceived health. These data are in line with those found by Sun and colleagues (18). The authors reported a percentage of 4.6 of PTSD symptoms in a large sample of the Chinese population (*n* = 2,091) with ages ranging from 30 to 60 years, and with some Italian studies that focused on COVID-19-related psychological distress in the Italian population (12, 13, 19, 20). In further studies, it could be interesting to compare the results obtained by Italian samples with samples from other countries (e.g., China) to check the similarities and differences on both psychological status and social and cultural changes that are COVID-19 related.

As expected, the comparison between our data with normative ones (15) on an Italian sample of healthy people suggested lower levels of general psychological well-being in Italians living this extraordinary emergency condition. These results would confirm that the stressful impact of the COVID-19 condition on psychological well-being is similar to the psychological burden caused by SARS and other virus outbreaks reported by studies in different countries (18, 21–23). These studies reported high levels of distress, anxiety, and mood disorders.

Considering sociodemographic and lifestyle information, the photograph of Italians in the coronavirus' time reported that most respondents spent social isolation at home, not quite alone but generally with other family members. The number of direct or indirect contacts with people affected by COVID-19 seems to be relatively low in the sample, especially considering the high reproductive number of the COVID-19 (24, 25). However, this result could be affected by the data collection in the early COVID-19 spread in the Italian population.

The results on the number of days spent in quarantine underlined a relationship with different aspects associated with psychological distress, such as anxiety, depression, decreasing of vitality, global well-being, and a general PTSD symptomatology.

These results would confirm the effect of the restrictive measures on psychological aspects, highlighting how the higher number of days spent in quarantine can play a cumulative role in developing distress, in line with previous studies on the effect of social isolation and quarantine (26). However, further studies are needed in order to report other risk factors and hopefully implement remote delivery of psychological interventions, to control psychological distress during the first stages of the present emergency.

Generally, we evidenced interesting results on the risk factors for well-being and psychological distress in emergencies due to the COVID-19 pandemic. Women, individuals younger than 50 years, those with high school degree or a bachelor's degree in disciplines other than health care, and those who present health risk factors seem to be more likely to have low psychological well-being. Moreover, people who are sure that they have had no contact with people affected by the infection reported higher psychological well-being levels. Also, those who have had close relationships with individuals (i.e., family members and friends), who were affected more or less severely by the virus, reported low psychological general well-being, confirming a role of fear and uncertainty about the epidemic progression on the levels of psychological distress (6). Finally, no confidence or uncertainty about the suitability of the Italian Government's measures negatively impacted psychological well-being, probably also as a consequence of the changes in the lifestyles, as suggested by our results.

These findings agree with previous studies (5, 6, 18, 26). The risk of infection generates fear in people, and above all, the COVID-19-related stressors, which include economic, daily life, social, and relational stressors, appear to be associated with worse psychological well-being. It would be useful to consider these aspects in order to implement specific interventions to prevent worsening of the psychological symptoms, leading to real psychological diseases, such as posttraumatic stress disorder. Both general demographic conditions and risk factors more closely related to the COVID-19 spread seem to influence the individuals, generating high levels of distress, and in some cases, they represent a warning sign for PTSD symptomatology, as confirmed by our results.

Another aim of this study was to consider the social impact of the COVID-19 outbreak. Our findings suggest that despite the optimism that referred to an improvement of the environmental condition, respondents had a negative perception about the influence of the COVID-19 on life and social aspects.

**TABLE 7** | Results of the logistic regression.

	PGWBI			PTSD symptoms		
	B	OR (95% CI)	P	B	OR (95% CI)	p
<b>Gender</b>						
Man	Reference		Reference			
Woman	1.09	3.0 (2.3–3.9)	0.0001	1.89	6.6 (2.4–18.1)	0.0001
<b>Age</b>						
18–29 years old	0.44	1.7 (1.1–2.1)	0.01	0.76	2.1 (0.8–5.4)	0.11
30–49 years old	0.48	1.6 (1.1–2.3)	0.01	0.89	2.4 (0.9–6.6)	0.08
>50 years old	Reference			Reference		
<b>Education</b>						
Until Middle School	–0.01	1.0 (0.6–1.7)	0.97	–1.09	0.3 (0.01–2.7)	0.31
High School	0.49	1.6 (1.2–2.2)	0.01	0.18	1.2 (0.6–2.5)	0.64
<b>Graduate and post-graduate</b>						
No Health Care	0.51	1.6 (1.2–2.3)	0.01	0.46	1.6 (0.7–3.4)	0.22
Health Care	Reference			Reference		
<b>Occupation</b>						
Student	0.23	1.2 (0.6–2.8)	0.57	0.34	1.4 (0.2–10.6)	0.75
Employed	0.10	1.0 (0.4–2.3)	0.97	0.82	2.3 (0.3–17.9)	0.44
Unemployed	0.31	1.4 (0.6–3.2)	0.46	0.14	1.2 (0.1–8.8)	0.89
Retired	Reference			Reference		
<b>Health risk factor</b>						
No	Reference			Reference		
Yes	0.57	1.8 (1.4–2.2)	0.0001	0.90	2.5 (1.6–3.9)	0.0001
<b>Italian Territorial Areas</b>						
North Italy	0.11	1.1 (0.9–1.4)	0.33	0.29	1.3 (0.8–2.2)	0.28
Center Italy	0.13	1.1 (0.9–1.4)	0.26	–0.11	0.9 (0.5–1.6)	0.70
South Italy	Reference			Reference		
<b>Average number of inhabitants, n (%)</b>						
<2,000	Reference			Reference		
2,000–10,000	0.18	1.2 (0.7–1.9)	0.45	0.30	1.3 (0.5–3.6)	0.55
10,000–100,000	–0.50	1.0 (0.6–1.5)	0.83	–0.25	0.8 (0.3–2.1)	0.62
>100,000	0.70	0.9 (0.6–1.5)	0.77	–0.45	0.6 (0.2–1.7)	0.37
<b>Number of usual daily interaction (no of people)</b>						
<10	Reference			Reference		
10–50	–0.26	0.8 (0.6–0.9)	0.01	–0.18	0.8 (0.5–1.3)	0.45
51–100	–0.09	0.9 (0.6–1.3)	0.61	–0.17	0.8 (0.4–1.9)	0.69
>100	–0.53	0.6 (0.3–1.1)	0.11	–0.16	0.8 (0.2–3.6)	0.82
<b>Quarantine experience</b>						
No	Reference			Reference		
Yes	–0.03	1.0 (0.7–1.3)	0.75	0.21	1.2 (0.6–2.4)	0.55
<b>Occupational status during COVID-19 emergency</b>						
Unemployed	Reference			Reference		
Keep on working out	–0.15	0.9 (0.6–1.2)	0.39	–0.67	0.5 (0.2–1.3)	0.16
Smart-working	–0.21	0.8 (0.6–1.1)	0.13	–0.10	0.9 (0.5–1.6)	0.74
Not-working	0.22	1.2 (0.9–1.8)	0.22	0.36	1.4 (0.7–2.8)	0.29
Economic problem						
No economic problem	–0.45	0.6 (0.5–0.9)	0.01	0.89	0.4 (0.2–0.9)	0.05
<b>Infected by COVID-19</b>						
No	Reference					
Do not know	0.27	1.3 (1.1–1.6)	0.01	0.55	1.7 (1.1–2.7)	0.05
Yes	1.08	2.9 (0.5–16.2)	0.21	N/A	N/A	N/A

(Continued)

TABLE 7 | Continued

	PGWBI			PTSD symptoms		
	B	OR (95% CI)	P	B	OR (95% CI)	p
<b>Direct contact with people infected by COVID-19</b>						
No	Reference			Reference		
Do not know	0.23	1.3 (1.1–1.6)	0.01	0.42	1.5 (0.9–2.4)	0.07
Yes	0.93	2.6 (1.2–5.3)	0.01	1.20	3.3 (1.1–9.9)	0.05
<b>Knowledge of people infected by COVID-19</b>						
No	Reference			Reference		
Yes	0.29	1.3 (1.1–1.7)	0.01	0.78	2.2 (1.4–3.4)	0.0001
<b>Knowledge of people in ICU for COVID-19</b>						
No	Reference			Reference		
Yes	0.33	1.4 (0.9–1.9)	0.05	0.95	2.6 (1.4–4.7)	0.01
<b>Knowledge of people died for COVID-19</b>						
No	Reference			Reference		
Yes	0.48	1.6 (1.0–2.5)	0.05	0.85	2.3 (1.1–4.8)	0.05
<b>Confidence in Italian Government</b>						
No	0.37	1.5 (1.1–1.8)	0.001	1.09	2.9 (1.9–4.7)	0.0001
Do not know	0.43	1.5 (1.2–2.1)	0.01	–0.50	0.6 (0.2–1.6)	0.31
Yes	Reference			Reference		

People largely perceived a moderate to drastic worsening of the economic and social conditions, although most of the respondents appeared highly confident about the information on the COVID-19 derived from state institutions as the Italian Government and the Civil Protection and even if they considered the restrictive measures taken by the government to be appropriate to the epidemic emergency. These findings agree with those reported during the H1N1 epidemic in Hong Kong (27), which showed a similar ambivalence between the general support toward the government and a sense of low confidence in its success to control the epidemic diffusion. The drastic changes due to the Italian Government measures to contain the COVID-19 were perceived as adequate for a large majority of the population during the survey, but they inevitably impacted daily life and recreational activities. The need for further risk analysis to identify what aspects of the pandemic emergency impact people, reduce the risk of psychopathological conditions that arise or persist even over the acute emergency, and represent an additional burden for the public health system is highlighted (28). This should be done in the light of the extension overtime of the state of emergency in several countries around the world (e.g., Spain, United States, and Brazil), the risk of second waves of the contagion, and the long-term consequences of the pandemic state of emergency.

The findings of this study provide the first evidence about the necessity to develop a psychological support strategy in the Italian population during and after the state of emergency, according to the suggestions of previous studies on epidemics (21, 29–33). It is crucial to prepare healthcare systems for the long-term medical and psychological consequences of this pandemic. Although further studies are needed, our results could help identify more high-risk populations for clinical diseases.

This study has some limitations. First, our design did not allow making a causal relationship, and prospective studies are needed to make causal inferences. Second, the possibility of selection bias due to the online survey should be considered, as evidenced by the oversampling of a particular population (e.g., students and women). This limit is particularly important to take into account considering the risk factor analyses, which the characteristics of the sample could influence. Another limitation is the use of self-report measures in the online survey. These instruments, especially if administered remotely, may be subjected to data collection biases. However, as reported in other studies on the COVID-19 pandemic, the adoption of an online survey represented the best solution because the social distancing measures limited data collection.

Therefore, the number of respondents with contact history with the COVID-19 was low, probably due to the data collection times. In the first days of the pandemic, the COVID-19 was not yet widespread in the Italian population, making our findings not generalizable to confirmed cases of COVID-19. Finally, it is more difficult to differentiate the influences due to the medical impact of the infection from the impact of quarantine measures, and further studies should consider it.

Our findings indicate that the COVID-19 pandemic appears to be an influential risk factor for the development of psychological diseases in the Italian population, as reported by other studies (5, 6, 18, 26) also on Italian samples (12, 19, 20), and accordingly with other studies on epidemic and quarantine conditions (7, 21, 34). The COVID-19 outbreak has substantially changed lifestyles, social perception, and institutions' confidence in the Italian and worldwide population, and it appears to have significant psychological consequences. Despite some limitations, this study provides information on the initial psychological, social, and lifestyle responses during

the outbreak of COVID-19 in Italy. Moreover, it provides an interesting point of view suggesting how future studies should distinguish between the effects directly resulting from the spread of the virus, and therefore closely related to the fears of contagion, and those caused by changes in people's lifestyle, due to more or less severe containment measures taken by governments. Our main goal was to demonstrate that the psychological and social impact of this outbreak cannot be minimized. According to our results, we propose considering the psychological, social, relational, and behavioral consequences of these exceptional events in interventions aimed at improving or preventing psychological distress and their impact on the general population's quality of life.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of the Department of Dynamic

and Clinical Psychology, "Sapienza" University of Rome. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MC, FF, and GF had the idea for and designed the study and had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis, and drafted the paper. FF and GF did the analysis. MC, FF, GF, and RT collected the data. All authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors critically revised the manuscript for important intellectual content and gave final approval for the version to be published.

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# The Role of Social Cognition Abilities in Parkinson's Disease in the Era of COVID-19 Emergency

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**Introduction:** Parkinson's Disease (PD) is characterized by motor and non-motor symptoms, among which deficits in social cognition might affect ~20% of patients. This study aims to evaluate the role of social cognitive abilities in the perceived impact of COVID-19 emergency, and the effects of lockdown measures on patients' social network and caregivers' burden.

**Methods:** Fourteen PD patients performed a neuropsychological battery including sociocognitive tasks before the introduction of COVID-19 restrictive measures (i.e., social distancing and isolation). A structured interview through an online platform was performed in the last 2 weeks of the first lockdown phase to assess patients' health status, perception of COVID-19 emergency, changes in caregivers' burden, and patients' social isolation. Non-parametric analyses were performed to evaluate the association between social skills and patients' COVID-19 perception, as well as the effects of restrictive measures.

**Results:** At baseline evaluation, half of the PD patients showed sociocognitive dysfunctions, mainly on mentalizing abilities. Patients with impaired social cognition skills showed a significantly lower concern on the possible effects of COVID-19 on their health. Caregiver burden and patients' social network remained stable during the lockdown.

**Conclusion:** These preliminary results underline that PD sociocognitive dysfunctions might affect patients' abilities to estimate the effects of COVID-19 infection. However, the lack of a significant increase in caregivers' burden and social isolation suggests, in our sample, a good coping to COVID-19 emergency. Since COVID-19 pandemic can have direct and indirect severe consequences in patients with PD, the development of educational and preventive programs is recommended.

**Keywords:** social cognition, COVID-19, Parkinson's Disease, caregivers, cognition

## INTRODUCTION

Since the end of 2019, the world has been overwhelmed by the spread of a new coronavirus (SARS-CoV-2), which forced the World Health Organization to declare the state of pandemic in March 2020. This action has been paralleled by the introduction in many countries of restrictive measures, such as social distancing, quarantine, and massive closure of commercial and productive activities, with a substantial effect on people habits and routines. To prevent the spreading of the virus and the high risk of the health-care system overwhelming, the Italian government introduced emergency security measures on March 9, 2020, including closed borders, social distancing, and isolation. With the progressive control of the emergency in terms of reduced rate of positive cases, hospital admissions, and patients requiring intensive care, less stringent measures were introduced. Overall, the Italian lockdown included restrictive measures that lasted from March 9, 2020 to May 3, 2020. However, the long-lasting period of quarantine may have led to important consequences in healthy subjects (Cerami et al., 2020) as well as in patients living with a chronic disease such as Parkinson's Disease (PD).

The restricted access to health care, physical inactivity, and psychosocial effects (Prasad et al., 2020) could potentially worsen motor and non-motor symptoms characterizing the disease and resulting from nigrostriatal dopamine depletion. Among these, cognitive symptoms might include executive, visuospatial, and social cognitive dysfunctions (Robbins and Cools, 2014). Notably, extensive literature on PD reports significant deficits in different facets of the social cognition such as emotion recognition (e.g., Baggio et al., 2012; Mattavelli et al., 2020), theory of mind (e.g., Bodden et al., 2010), and empathy (Martinez et al., 2018). Overall, social skills play a crucial role in detecting and predicting actions, intentions, and emotions on the basis of individual knowledge (Barnes-Holmes et al., 2004), and they have been previously related to the individual engagement in recommended precautions during a health crisis (Puterman et al., 2009). An impairment in these abilities in the context of COVID-19 quarantine may thus lead to severe consequences, such as situational misinterpretations and increased conflicts in social and familial relationships.

Social cognition deficits contribute to characterize PD clinical picture together with other motor and non-motor symptoms. With the progression of the disease, PD patients might tend to move from a public into a private world to mask these symptoms, with a significant and progressive reduction in their social engagement due to stigmatization (Maffoni et al., 2017). Social isolation represents one of the major risk factors for the development of cognitive decline and dementia (Livingston et al., 2017), and specifically in PD social support has been found as one of the major variables in positively affecting daily living (Ambrosio et al., 2019). In this sense, informal caregivers have a key role in practical and psychological support for PD patients. However, this role exposes them to changes in emotional and physical health, social life, and financial status (Martinez-Martin et al., 2012). Despite an emerging body of literature on PD care during the COVID-19 emergency (Papa et al., 2020;

Prasad et al., 2020; Salari et al., 2020; Shalash et al., 2020), very little is known about caregivers' experiences. Quarantine and lockdown measures significantly forced them to deal with changes in their daily routines, including personal, family, and patients' management. While recent evidence showed in PD carers higher anxiety levels related to COVID-19 emergency compared to controls (Salari et al., 2020), it is still unclear whether the restrictive measures affected caregivers' well-being.

The aim of this preliminary study is thus to explore the effects of social cognition deficits in the perception of COVID-19 emergency in PD patients as well as their relationship with caregivers' burden. Besides, we investigated possible changes in patients' perceptions of social support and in caregiver well-being through an online interview performed in the last 2 weeks of the first lockdown phase in Italy. We hypothesized that social cognition deficits in PD might affect patients' perceptions of the COVID-19 emergency and that COVID-19 containment could possibly increase PD patients' perceived social isolation and caregivers' burden.

## MATERIALS AND METHODS

### Subjects

Fourteen PD patients were included in the context of the longitudinal project "Study of the neural bases underlying the beneficial effects of physical activity in Parkinson's disease." Patients were recruited from the Centre for Neurocognitive Rehabilitation (CeRiN) in Rovereto, Italy. Inclusion criteria were diagnosis of idiopathic PD based on the criteria of the International Movement Disorder Society (Postuma et al., 2015), Hoehn and Yahr scale  $\leq 3$  (Hoehn and Yahr, 1967); absence of dementia or other significant psychiatric or neurological disorders; basic computer knowledge and Internet access. All subjects underwent a baseline clinical evaluation by experienced neurologists and neuropsychologists between January and February 2020, and a follow-up assessment through an online platform between April 20 and May 3, 2020. Patients were assessed during the "ON" state, and data on the motor symptoms through the Unified Parkinson's Disease Rating Scale (MDS-UPDRS) part III (Goetz et al., 2008) were collected. Caregivers were interviewed at both baseline and follow-up. Demographics and clinical data for the 14 PD patients are shown in **Table 1**. Eleven patients were characterized by a tremor-dominant phenotype and three patients by a postural instability and gait disturbances phenotype. Mean UPDRS-part III score was  $15.5 \pm 5.8$ . All patients were treated at the time through antiparkinsonian drugs, that is (levodopa, dopamine-agonists, MAO-, and COMT-inhibitors). Patients' caregivers included first-degree relatives (caregiver-patient relationship: consort  $n = 12$ , offspring  $n = 2$ ; caregiver civil status: married  $n = 13$ , single  $n = 1$ ; male/female: 6/8; average age in years =  $60.2 \pm 13.4$ , average years of education =  $13.5 \pm 4.6$ ).

All subjects gave informed consent to clinical evaluation according to the local Ethical Committee. The original study protocol, as well as the telemedicine extension, was approved by the Institutional Review Board (Protocol Number 2019-033).

**TABLE 1** | Demographics and clinical profile of the enrolled sample.

	Mean ± SD	Cut-off score	Impaired performance (borderline)
<b>DEMOGRAPHICS</b>			
Sex (number of M/F)	7/7		
Age in years	55.5 ± 8.7	-	-
Years of education	13.4 ± 4.8	-	-
<b>CLINICAL</b>			
UPDRS III	15.5 ± 5.8	-	-
Geriatric depression scale	8.1 ± 7.2	>9*	5 mild, 1 severe
Disease duration (years)	5.7 ± 4.1	-	-
<b>NEUROPSYCHOLOGICAL</b>			
MoCA (0–30)	24.4 ± 2.6	<17.363	0 (1)
Digit forward (0–8)	6.1 ± 0.9	<4.26	0 (0)
Digit backward (0–8)	4.3 ± 0.9	<2.65	0 (1)
Corsi block tapping task (0–9)	5.1 ± 1.1	<3.46	1 (3)
Rey Auditory Verbal Learning immediate recall (0–75)	46.0 ± 9.3	≤28.52	0 (0)
Rey Auditory Verbal Learning delayed recall (0–15)	9.4 ± 2.4	≤4.68	0 (0)
Rey-Osterrieth complex figure recall (0–36)	16.3 ± 6.0	<9.47	0 (2)
Trial making test A	44.4 ± 15.9	≥94	0 (0)
Trial making test B	143.2 ± 91.2	≥282	1 (1)
Trial making test B–A	98.8 ± 82.7	≥187	2 (1)
Attentive Matrices (0–60)	50.6 ± 6.2	<31	0 (0)
Stroop time interference effect	23.7 ± 15.0	≥36.92	2 (0)
Stroop error interference effect	1.3 ± 2.0	≥4.24	1 (0)
Verbal fluency on phonemic cue	40.2 ± 12.1	<17.35	0 (0)
Verbal fluency on semantic cue	44.1 ± 9.7	<23.59	0 (0)
Naming (objects) (0–48)	47.2 ± 1.1	≤41.48	0 (0)
Naming (actions) (0–50)	48.1 ± 1.7	≤36.86	0 (0)
Line orientation judgment test (0–30)	22.6 ± 3.8	<19	0 (1)
Unknown face recognition task (0–50)	45.6 ± 4.9	<39	1 (0)
Rey-Osterrieth complex figure copy (0–36)	31.6 ± 2.9	<28.88	1 (0)
Ekman 60 Faces test (0–60)	49.1 ± 6.1	≤37.46	0 (0)
SET Intention attribution (0–6)	4.9 ± 1.2	<2.35	1 (1)
SET Emotion attribution (0–6)	4.3 ± 1.7	<2.21	3 (2)
SET Causal inference (0–6)	4.5 ± 1.4	<2.42	1 (2)
SET global score (0–18)	13.5 ± 3.6	<8.30	2 (1)
IRI Fantasy	17.9 ± 2.4	<11**	0 (0)
IRI Perspective Taking	19.1 ± 6.3	<12**	1 (4)
IRI Empathic concern	24.4 ± 5.9	<24**	6 (1)
IRI Personal distress	20.0 ± 6.2	3 < >27**	1 (3)

SD, standard deviation; UPDRS, Unified Parkinson's Disease Rating Scale; MoCA, Montreal Cognitive Assessment; SET, Story-based Empathy Task; IRI, Interpersonal Reactivity Index.

\*Based on (Yesavage et al., 1982).

\*\*Due to the lack of Italian normative values, mean, and standard deviation values previously reported (Rankin et al., 2005) were used to derive explorative cut-off scores (mean ± 2 SD for impaired performance; mean ± 1.5 SD for borderline performance).

## Baseline Neuropsychological Assessment

Social cognition abilities have been assessed through different tests evaluating emotion recognition abilities (Ekman 60 Faces Test-Ek-60F) (Dodich et al., 2014) and theory of mind (Story-based empathy task-SET) (Dodich et al., 2015). The SET is a non-verbal task assessing the ability to attribute mental states based on intention (SET-IA) and emotion (SET-EA), as well as the ability to infer causal relationship (i.e., SET-CI).

Empathic attitude has been assessed through the Interpersonal Reactivity Index (IRI) (Davis, 1980; Rankin et al., 2005), a 28-item questionnaire administered to caregivers and including both cognitive (perspective-taking IRI-PT, fantasy IRI-F) and affective aspects of empathy (empathic concern IRI-EC, and personal distress IRI-PD). The revised version of the Lubben social network scale (LSNS-R) (Lubben et al., 2006) has been used to assess patients' social network.



Besides, all subjects underwent a standard neuropsychological assessment, including tests evaluating the global cognitive status (Conti et al., 2015), short-term memory [Digit Span forward (Monaco et al., 2013), Corsi block-tapping test (Monaco et al., 2013)], long-term memory [Rey Auditory Verbal List test (Carlesimo et al., 1996), Rey-Osterrieth complex figure recall (Caffarra et al., 2002a)], attention/executive functions [i.e., attentional matrices (Spinnler and Tognoni, 1987), digit span backward (Monaco et al., 2013)], verbal fluency (Carlesimo et al., 1996; Zarino et al., 2014), Stroop task (Caffarra et al., 2002b), trial making test (Giovagnoli et al., 1996), language [i.e., naming (Caticala et al., 2013; Papagno et al., 2020)], visuospatial line orientation judgment test (Benton, 1983), the unknown face recognition test (Benton et al., 1983), and visuo-constructional abilities [Rey-Osterrieth complex figure copy (Caffarra et al., 2002a)].

Caregivers' burden were assessed through the Caregiver Burden Inventory (CBI) (Novak and Guest, 1989). This questionnaire includes 24 items investigating five different dimensions: time-dependence (CBI-TD), developmental (CBI-D), physical (CBI-P), social (CBI-S), and emotional (CBI-E) burden. Higher scores implicate greater burden.

## Telemedicine Assessment

The follow-up assessment was performed through an online platform. The structured interview included questions about patients' health statuses ("Have you received medical assistance in the last 2 months?" "Have you modified your pharmacological treatment?" "Have you noticed a disease progression?") and perceived changes in motor and non-motor symptoms ("Do you think that your cognitive/motor symptoms are worsened during the lock-down?" "Have you noticed mood changes during the lockdown?"). In case of positive answers, subjects were asked to specify. Patients were then asked if they were aware of the COVID-19 emergency, and patients' perceptions were assessed through two questions ("Are you concerned about the effect that COVID-19 may have on your health?" and "How severe do you think the COVID-19 emergency is for the society?") using a 5-point Likert scale (1: not at all, 5: very much). Together with the structured interview, LSNS-R and CBI scales were also readministered to assess changes in patients' social network and in caregivers' burden.

## Statistical Analyses

We evaluated the percentage of patients with social cognition deficits based on the Italian normative data. Then, in order to assess the effects of social cognition abilities on patients' responses to lockdown measures and to caregivers' well-being, we correlated through Spearman's rank correlation analysis the adjusted performance at social tasks with patients' perceptions of COVID-19 emergency and CBI subscales. Besides, a Mann-Whitney U test has been performed to compare patients' perceptions of the COVID-19 emergency, dividing PD patients according to social cognition impairments, based on literature-defined cut-off scores (Table 1). Finally, CBI and LSNS-R scores were compared through Wilcoxon Signed Ranks Test in order to assess the effect of lockdown measures on caregivers' well-being

and patients' social network. Non-parametric statistics were performed due to the small sample size and to non-normal data distribution, evaluated through the Shapiro-Wilk test. Analyses were conducted using IBM SPSS Statistics for Windows v23.0 (Armonk, NY IBM Corp.).

## RESULTS

At the baseline neuropsychological evaluation, 10 patients were classified as cognitively unimpaired, while four patients presented a non-amnesic mild cognitive impairment (Table 1). No patients showed defective performance at the EK-60F test according to the normative data. Emotion attribution, evaluated through SET-EA, was impaired in 3 patients out of 14, with the other two patients obtaining a borderline score. Only two subjects poorly performed in the SET subtask of intention attribution. Notably, in the IRI, five patients showed reduced perspective-taking, while half of the sample was characterized by poor empathic concern. Finally, four patients showed high levels of IRI personal distress, while fantasy was above the cut-off score in all patients. At the follow-up structured interview, three patients felt the disease went faster in the 2 months of lockdown. Four patients reported increased memory difficulties, while increased anxiety was reported in three patients out of 14. A worsening in motor functioning was reported in eight patients out of 14. Three patients received medical assistance related to PD symptoms with subsequent PD-therapy modifications (two therapy reductions secondary to increased levodopa-induced dyskinesia and one increased therapy due to worsening of tremor and bradykinesia). Concerning COVID-19 emergency, all patients were aware of the situation and perceived a high severity for the society (median = 5, IQ range [4.75–5]), despite a low concern for their own health (median = 2, interquartile range [1–3]).

The correlation analysis between COVID-19 perception and social cognition abilities showed a correlation of patients' concerns related to health with patients' perspective-taking abilities (IRI-PT  $r_s = 0.71$ ,  $p = 0.005$ ) and personal distress (IRI-PD  $r_s = -0.72$ ,  $p = 0.004$ ). No significant relationship was found with other social skills. However, IRI-PT was significantly correlated with emotion attribution abilities (SET-EA subscore  $r_s = 0.60$ ,  $p = 0.02$ ) and overall mentalizing abilities (SET-GS  $r_s = 0.55$ ,  $p = 0.04$ ). PD patients with social cognition deficits showed a reduced concern (mdn = 2, interquartile range [1–2]) compared to patients with unimpaired social skills (mdn = 3 interquartile range [2.5–4]) (Mann-Whitney  $U = 40$ ,  $p = 0.04$ ). No significant results were found in the association between judgement of the COVID-19 emergency at the societal level and social skills. MCI and cognitively unimpaired PD patients showed no significant differences in COVID-19 perception (COVID-19 emergency at societal level Mann-Whitney  $U = 19$ ,  $p = 0.9$ , COVID-19 health-related concern Mann-Whitney  $U = 12$ ,  $p = 0.3$ ), and no significant correlation emerged with the global cognitive status, evaluated through the MoCA score (COVID-19 emergency at societal level  $r_s = -0.17$ ,  $p = 0.5$ , COVID-19 health-related concern  $r_s = 0.40$ ,  $p = 0.15$ ).

Concerning caregivers' burden, lower perspective-taking abilities were found to be associated at baseline with higher caregivers' burden in the CBI subscales time-dependence (CBI-TD  $r_s = -0.57, p = 0.03$ ), Developmental (CBI-D  $r_s = -0.6, p = 0.02$ ), and emotional (CBI-E  $r_s = -0.60, p = 0.02$ ) burden, as well as in CBI global score ( $r_s = -0.62, p = 0.02$ ). Lower mentalizing performance was associated with higher physical (SET-GS:  $r_s = -0.60, p = 0.02$ ) and emotional (SET-GS:  $r_s = -0.60, p = 0.02$ ) CBI scores. Finally, higher CBI global scores were associated to higher personal distress (IRI-PD  $r_s = 0.56, p = 0.04$ ). No other significant correlations emerged. Non-parametric analyses, performed to evaluate significant changes in CBI and LSNS-R, found no significant differences, except for CBI social burden scores, in which caregivers showed a burden reduction compared to the baseline assessment ( $T = 5, z = -2.1, p = 0.04$ ) (Table 2).

## DISCUSSION

In this preliminary study, we report our experience at ascertaining the implications of COVID-19 in 14 PD patients from our center, and we explored the relationship between social cognition deficits and patients' perceptions of the COVID-19 emergency, as well as the effect of COVID-19 restrictive measures (i.e., lockdown and self-isolation) on caregivers' burden and patients' social isolation.

Overall, the results of the present study possibly suggest that social cognition deficits in PD patients might influence the correct interpretation of the risks related to COVID-19 infection, confirming the first hypothesis of the present study. Despite these results being explorative, we provided evidence of a possible association between lower abilities of perspective-taking and lower concern on the possible effects of COVID-19 on patients' health. Furthermore, a lower concern for COVID-19 was associated with a higher personal distress, which is considered as the negative side of affective empathy (i.e., tendency to feel pain when exposed to the suffering of others). Representing the most primitive precursor of empathy from a developmental point of view, personal distress seems to have

an adverse effect in thwarting empathic response rather than enhancing it (Kim et al., 2018). Future studies on larger samples with a comparison group are thus recommended to investigate the effect of social cognition deficits on the perception of the COVID-19 emergency and on the adherence to preventive measures. Recent evidence suggests in fact a higher risk in PD patients for worse respiratory complications after the COVID-19 infection (Fasano et al., 2020; Helmich and Bloem, 2020) and a possible higher mortality rate for older patients with a longer disease duration (Antonini et al., 2020). Thus, it is highly desirable for PD patients to strictly apply to all the required preventive measures to minimize the risk of infection. In our sample, lower empathy and mentalizing ability were also associated with higher caregiver burden. This result is in agreement with previous studies showing that social cognition impairments in PD can significantly affect caregivers' well-being, possibly due to caregivers' lack of awareness of these deficits (Martinez et al., 2018).

On the other hand, despite the risk of negative effects on patients' social isolation and caregivers' burden due to COVID-19 restrictive measures, the lack of significant changes in our sample does not confirm the second hypothesis of the present study (i.e., increase of PD patients perceived social isolation and caregivers burden due to COVID-19 containment). Unexpectedly, caregivers showed a reduction in social burden, possibly suggesting a supporting role of patients' families, also in agreement with the lack of significant changes in patients' social network. This could be partially explained by the Italian sociocultural framework, in which family has a central role in patients' caring (Glaser et al., 2004), or by a reduced burden of daily activities due to the forced lockdown. Overall, the small sample size and the lack of a control group represent the main limitations of the current work, hampering the generalization of the results. Despite finding a good coping to the COVID-19 emergency, studies on larger samples are needed, including patients with different disease severities and with limited access to new technologies. As a matter of fact, while elderly people from rural areas and with low education are those who have the most limited access to new technologies (Marcellini et al., 2007; Poushter, 2016), they are also those

**TABLE 2** | Pre-post comparison of Caregiver Burden Inventory (CBI) and Lubben Social Network Scale-Revised (LSNS-R).

	Baseline	Follow-up	Statistics
<b>CAREGIVER</b>			
CBI-global score	12.5 [5.5–30.25]	18 [4.75–29.75]	$z = -0.5, p = 0.7$
CBI-time dependence	3 [0–7]	4.5 [1–11]	$z = -1.4, p = 0.15$
CBI-developmental	3.5 [0.75–7]	5 [2.25–8.75]	$z = -0.72, p = 0.5$
CBI-physical	2.5 [0.75–5.75]	3 [0.25–6.75]	$z = -0.5, p = 0.65$
CBI-social	1 [0–7.5]	1.5 [0–2.75]	$z = -2.1, p = 0.04$
CBI-emotional	1 [0–3]	1.5 [0–3.5]	$z = -0.72, p = 0.5$
<b>PATIENT</b>			
LSNS-R	35 [30.7544]	37.5 [28.75–43.5]	$z = -0.2, p = 0.8$

CBI, Caregiver Burden Inventory; LSNS-R, Lubben Social Network Scale-Revised.

who may have been most affected by the social distancing measures. Finally, another limitation of this work is represented by the inability to carefully assess the effects of individual sociodemographic and psychological factors in coping with the COVID-19 emergency. Studies including larger patient samples are required to evaluate the possible effects of behavioral variables (Santangelo et al., 2016; Preis et al., 2017), as well as the role of individual features (e.g., Park et al., 2021), in the interpretation of the COVID-19 emergency. Besides, a more in-depth assessment of patients' perceptions of the risks related to the COVID-19 pandemic is recommended. While no specific questionnaires were available at the time of this preliminary study, the progressive introduction of validated scales and questionnaires (e.g., Cortez et al., 2020) will allow a more detailed evaluation of the cognitive and psychological factors related to the interpretation of the COVID-19 emergency. In conclusion, in this study we provided preliminary evidence in PD of a possible effect of social cognition dysfunctions in interpreting the COVID-19 emergency. Since PD patients represent a vulnerable population for the COVID-19 infection, the development of educational initiatives for both patients and caregivers, possibly converted into telemedicine programs, might help in managing the possible consequences of this new health challenge.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Comitato Etico per la sperimentazione con l'essere umano, Università di Trento. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

LT, CP, MF, AD, and FZ: conception and organization of the project. CM, MF, PN, AG, and EP: acquisition, analysis of data. AD, MF, and CP: data interpretation. AD and CM: first drafting the work. All authors revised the manuscript and provided the approval of the work.

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# Promoting Graduate Student Mental Health During COVID-19: Acceptability, Feasibility, and Perceived Utility of an Online Single-Session Intervention

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The COVID-19 outbreak has simultaneously increased the need for mental health services and decreased their availability. Brief online self-help interventions that can be completed in a single session could be especially helpful in improving access to care during the crisis. However, little is known about the uptake, acceptability, and perceived utility of these interventions outside of clinical trials in which participants are compensated. Here, we describe the development, deployment, acceptability ratings, and pre-post effects of a single-session intervention, the Common Elements Toolbox (COMET), adapted for the COVID-19 crisis to support graduate and professional students. Participants ( $n = 263$ ), who were not compensated, were randomly assigned to two of three modules: behavioral activation, cognitive restructuring, and gratitude. Over 1 week, 263 individuals began and 189 individuals (72%) completed the intervention. Participants reported that the intervention modules were acceptable (93% endorsing), helpful (88%), engaging (86%), applicable to their lives (87%), and could help them manage COVID-related challenges (88%). Participants reported pre- to post-program improvements in secondary control (i.e., the belief that one can control their reactions to objective events;  $d_{av} = 0.36$ ,  $d_z = 0.50$ ,  $p < 0.001$ ) and in the perceived negative impact of the COVID-19 crisis on their quality of life ( $d_{av} = 0.22$ ,  $d_z = 0.25$ ,  $p < 0.001$ ). On average, differences in their perceived ability to handle lifestyle changes resulting from the pandemic were positive, but small and at the level of a non-significant trend ( $d_{av} = 0.13$ ,  $d_z = 0.14$ ,  $p = 0.066$ ). Our results highlight the acceptability and utility of an online intervention for supporting individuals through the COVID-19 crisis.

**Keywords:** public health, digital mental health, evidence-based practices, COVID-19, graduate students, common elements, cognitive-behavioral therapy, positive psychology

## INTRODUCTION

In addition to the serious physical health consequences of COVID-19, the resulting societal changes have had major impacts on population-wide mental health (Liu et al., 2020). COVID-19 has introduced a variety of stressors into modern life, including fears about contracting the virus, concern for loved ones, economic instability, social distancing, and other major lifestyle disruptions

(Pfefferbaum and North, 2020). Many of these concerns have affected graduate and professional students (i.e., students earning advanced degrees, as well as non-traditional and non-degree seeking students). Even before the crisis, students were vulnerable to depression, anxiety, loneliness, and suicidal ideation (Evans et al., 2018). The COVID-19 crisis has exacerbated these concerns: many universities have ceased non-essential operations, mandated that students leave campus, and shut down university counseling centers (Zhai and Du, 2020). These measures, while appropriate to avoid the spread of COVID-19, have led to considerable uncertainty, stress, and disruption for graduate and professional students (Chirikov et al., 2020; Sahu, 2020). In open-ended surveys, graduate and professional students report a variety of concerns relating to their health, productivity, and well-being (Wasil et al., 2021a). Furthermore, in a recent survey of over 15,000 graduate students, about 32% of students reported elevated depressive symptoms and 39% reported elevated anxiety symptoms (Chirikov et al., 2020). The estimated rates of depression and anxiety in 2020 were 1.5–2 times higher in 2020 than in 2019 (Chirikov et al., 2020). To support graduate and professional students, evidence-based mental health and wellness promotion efforts are needed.

Traditional mental health services, while essential, will not be sufficient to meet the growing need for mental health care during this crisis. As a result of social distancing requirements, many clinicians and mental health care organizations have moved counseling activities to telehealth platforms (Torous et al., 2020). However, even before the COVID-19 crisis, the demand for mental health services greatly exceeded the availability of professionals, with only a small fraction of individuals in need of mental health services receiving care (Kazdin and Blase, 2011). Due to the pre-existing lack of mental health care providers, the growing demand for services, and the strain on the health care system, telehealth platforms cannot serve as the only option during the pandemic. As such, scalable methods of delivering mental health interventions could be especially impactful during the COVID-19 crisis.

One promising approach involves the development and dissemination of evidence-based digital self-help interventions. Digital self-help interventions have several features that make them appealing in times of crisis. First, these interventions do not require in-person support and thus do not place additional burden on the health care system. Second, these interventions can be disseminated cheaply (or for free) to wide audiences. Third, digital interventions can be updated and adapted in short periods of time. This could be especially useful during the pandemic, as evidence-based content could be adapted specifically to address concerns relating to COVID-19. Finally, digital interventions are effective for a variety of mental health conditions, including depression and anxiety (Josephine et al., 2017; Karyotaki et al., 2017), and some have been shown to be effective in just a single session (Schleider and Weisz, 2018; Osborn et al., 2020). Thus, digital interventions could provide low-intensity evidence-based care to individuals who need support during the crisis but lack access to other services.

However, the uptake of digital interventions in real-world settings has been poor. Although evidence from clinical trials

supports the acceptability of digital mental health interventions, findings from controlled clinical trials may not generalize to use in naturalistic settings. Recent evidence shows that uptake and engagement rates for digital interventions are lower in open field studies than in formal clinical trials (Fleming et al., 2018). Because participants in clinical trials are often financially compensated for consistent participation and clinical trials attract highly motivated participants, formal trials yield unrealistically high estimates of engagement. In order to improve the dissemination of digital interventions, studies focused on the acceptability and uptake of digital interventions in real-world contexts are needed (Mohr et al., 2017). Although there are some digital interventions with relatively high uptake (as measured by number of downloads), these interventions have not been rigorously evaluated, contain a limited amount of evidence-based content (Wasil et al., 2019), and generally fail to retain users (Baumel et al., 2019; Wasil et al., 2020a, 2021b). Indeed, most mental health apps have only 4% of users continue to engage with the apps after 15 days, and many have no active monthly users (Baumel et al., 2019; Wasil et al., 2020b, 2021c). Some barriers that limit engagement for digital interventions include lack of perceived utility, limits on accessibility (e.g., fees or geographic restrictions), poor user experiences, and high demands on users' time (Torous et al., 2018). As a result, there is a need for digital mental health interventions that (a) include evidence-based content, (b) demonstrate acceptability and feasibility outside of formal clinical trials, (c) minimize demands on users' time, and (d) are available at no cost.

Single-session interventions, which can be completed in one sitting, may be particularly useful. Meta-analytic evidence suggests that single-session interventions have effects similar in magnitude to those of psychotherapies that last several months (see Schleider and Weisz, 2017), and some online single-session interventions have shown effects on depression even at 4–9 months follow-ups (e.g., Schleider and Weisz, 2018). In addition to their effectiveness, single-session interventions are highly scalable, can be disseminated at very low costs, and can be adapted readily for new populations (see Osborn et al., 2020; Wasil et al., 2020c). Online single-session interventions also circumvent concerns about user retention, as users only need to engage with the intervention once to receive the full dose of content. However, there are several gaps in research on online single-session interventions. For instance, limited research has examined the acceptability of online single-session interventions outside the context of controlled clinical trials. Additionally, while online single-session interventions often include content that has been shown to be effective for individuals across age groups, most research on online single-session interventions has been conducted with youth and adolescents (Schleider and Weisz, 2017). Finally, few online single-session interventions have been adapted to respond to a public health emergency, such as the COVID-19 crisis. As such, a digital single-session intervention adapted specifically to meet the needs of the current crisis would provide a considerable contribution to the field.

Such an intervention would be especially valuable if it included modules that are commonly included in empirically

supported interventions. Whereas mental health interventions have traditionally been tested in multicomponent packages, often in the form of published treatment manuals, scholars have recently pushed for a focus on specific procedures within interventions (Hofmann and Hayes, 2019). Relatedly, some scholars have identified treatment procedures that are commonly included in treatment manuals of empirically supported interventions (Chorpita and Daleiden, 2009). These procedures, known as “common elements,” have formed the basis of recently-developed modular interventions. Such interventions include the *Modular Approach to Therapy for Children with Anxiety, Depression, Trauma, or Conduct Problems* (MATCH; Weisz et al., 2012) and the *Common Elements Treatment Approach* (CETA; Murray et al., 2014). Advantages of modular interventions include their flexibility, scalability, and adaptability (see Weisz et al., 2012). Modular interventions could be especially useful in the context of the COVID-19 crisis, as modules can be adapted or replaced to meet the needs of specific populations (e.g., patients, healthcare workers, individuals under stay-at-home orders). While previous research has shown that modular interventions are effective when delivered by clinicians (Weisz et al., 2012) and trained lay counselors (Murray et al., 2014), relatively little is known about modular interventions as self-administered digital interventions.

To fill these gaps, and to provide timely support to students dealing with the COVID-19 crisis, our team adapted and deployed an online single-session intervention for graduate and professional students.

We believed that a self-administered intervention focused on common elements could be valuable. In this paper, we describe the *Common Elements Toolbox* (COMET), a self-administered digital single-session intervention. Here, we describe (a) the development and design of COMET, (b) adaptations we made to COMET to respond to the COVID-19 crisis, (c) an evaluation of the acceptability and perceived utility of COMET, and (d) changes in secondary control and COVID-19 related concerns from pre-intervention to post-intervention. In addition to filling important gaps in the literature, our goal is to provide information that can directly inform other digital mental health promotion efforts in response to the COVID-19 pandemic.

## MATERIALS AND METHODS

### Selection of COMET Intervention Modules

In September of 2019, our team began to develop an online single-session intervention to promote college student mental health. To begin this process, we reviewed literatures on common elements in empirically supported treatments (Chorpita and Daleiden, 2009; Higa-McMillan et al., 2016), treatment elements in existing digital interventions (Wasil et al., 2019), psychologically “wise” single-component interventions (Walton and Wilson, 2018), positive psychology interventions (Seligman et al., 2005), and single-session interventions (Schleider and Weisz, 2017). As much of this literature focused on youth and adolescent populations, we supplemented our review by

examining treatment manuals for adults (Nathan and Gorman, 2015). Our aim in this review was to identify intervention techniques to include in the single-session intervention that were shown to be effective, ideally when administered on their own, and could be taught easily in a self-guided format.

With these criteria in mind, we chose three modules to include in COMET: behavioral activation, cognitive restructuring, and gratitude. Behavioral activation and cognitive restructuring are both considered core components of cognitive-behavioral therapies. Numerous studies have demonstrated the effectiveness of web-based cognitive behavioral therapy in treating depression and anxiety (see Karyotaki et al., 2017 for a meta-analysis). Gratitude is a common element in several empirically supported positive psychology interventions (see **Supplementary Materials** for details). Additionally, meta-analytic evidence suggests that gratitude interventions reduce symptoms of depression and anxiety (Cregg and Cheavens, 2020) and improve subjective well-being (Davis et al., 2016; Dickens, 2017).

From September 2019 to February 2020, we prepared an intervention with these three modules for a pre-registered randomized controlled trial with undergraduate students (NCT04287374; see **Supplementary Materials** for details). The undergraduate version of COMET was based on previous CBT and gratitude interventions, and the design of the intervention was informed by that of previous web-based single-session interventions (Seligman et al., 2005; Nathan and Gorman, 2015; Schleider and Weisz, 2017, 2018; Osborn et al., 2020; Schleider et al., 2020; Wasil et al., 2020d). As we finished developing the undergraduate version of COMET in March 2020, COVID-19 began to rapidly spread throughout the United States, including the greater Philadelphia area. In light of the mental health crisis due to COVID-19 disruptions, we decided to adapt the existing intervention into a separate intervention for graduate and professional students.

Over the course of 2 weeks, adaptations were made to COMET to increase its relevance to the COVID-19 crisis. For example, the initial intervention included a vignette about a student struggling with rejection from summer internships. For the adapted version, we replaced this vignette with one about a student who is struggling to adjust to lifestyle changes resulting from the COVID-19 crisis. We also consulted relevant stakeholders: we received feedback from undergraduate students, graduate students, and faculty in order to refine the intervention. In response to input from university deans about the length of the intervention, we decided to provide only two of the three modules to each participant. This was done to maximize the likelihood that students would choose to participate, thus increasing the reach of our intervention. The specific modules provided to a given student were determined randomly (see **Supplementary Materials** for details).

### Adapted Version of COMET for COVID-19

At the beginning of the adapted intervention, participants read a short introduction message describing the purpose of the intervention. Participants were then randomly assigned to receive two of the three intervention modules: behavioral activation, cognitive restructuring, and gratitude.

## Behavioral Activation

The purpose of the behavioral activation module (labeled “positive activities” to sound less technical and to improve comprehension) was to help participants identify and perform activities that bring them happiness or provide a sense of mastery. Participants received psychoeducation about pleasurable activities (i.e., enjoyable activities) and mastery activities (i.e., activities that provide a sense of accomplishment). Next, they were prompted to brainstorm and list positive activities, with at least one being a pleasurable activity and at least one being a mastery activity. Participants were then instructed to select an activity to perform more frequently in the upcoming weeks. Then, they reflected on why this activity is important to them and how this activity influences their mood. Finally, participants completed a plan describing when they will perform the activity, where they will be, who they could tell about their plan to help them stay accountable, and how they will overcome obstacles that might get in the way of their plan (see **Supplementary Figure 1**).

## Cognitive Restructuring

The purpose of the cognitive restructuring module (labeled “flexible thinking” to sound less technical and to improve comprehension) was to help participants notice and reframe unrealistic negative thoughts. Participants first received brief psychoeducation about negative thoughts and thinking traps. They were then presented with a short vignette about “Gwen,” a hypothetical graduate student whose routine has been affected by coronavirus. In the vignette, participants read that Gwen feels like she has lost control over her routine and feels frustrated with herself for not keeping up with her work and health goals while under quarantine. Gwen also expresses worries that her friendships may suffer while she’s in isolation (see **Supplementary Figure 2**).

After reading the vignette, participants learned a cognitive restructuring technique called the “ABCD Technique” and applied it to Gwen’s situation. They were prompted to identify details about the Activating Event (i.e., list objective facts about Gwen’s situation), list Beliefs (i.e., initial worries or concerns that Gwen might have), generate ways to Challenge the negative or unrealistic beliefs (i.e., ways Gwen could reframe her initial concerns), and Debrief (i.e., indicate how Gwen might be feeling as a result of challenging her beliefs). After each step, participants viewed an example of a completed response (e.g., after they listed ways Gwen could challenge her beliefs, they were provided with examples of ways that Gwen could challenge her beliefs). These examples were presented to participants to provide them with real-time feedback and a model response (see **Supplementary Figure 3**). After applying the ABCD Technique to Gwen’s vignette, participants were prompted to use the ABCD Technique to restructure their thoughts about a distressing situation in their own lives.

## Gratitude

The purpose of the gratitude module was to encourage participants to notice and appreciate positive things in their lives. Participants started the module by briefly reading about

benefits of gratitude and past research on gratitude interventions. Then, participants completed the Three Good Things exercise (see Seligman et al., 2005). They received instructions to identify three good things that happened to them in the past 2 days. For each good thing, they also wrote a brief reflection explaining why it was meaningful to them and how to increase the odds of it happening again. Before writing their good things, participants viewed an example written by a hypothetical student (see **Supplementary Figure 4**). Finally, participants completed a novel *present-focused gratitude* exercise. In this exercise, participants were prompted to take a few moments to notice and appreciate things around them (e.g., “I love the color of that chair,” “I’m very warm and comfortable right now”). Because the present-focused gratitude exercise involves noticing things in one’s immediate environment, we believed that it would be especially relevant during the COVID-19 crisis, in which many individuals are staying in the same environment (e.g., at home).

## Recruitment

We partnered with the Behavior Change for Good Initiative and administrators at the University of Pennsylvania to email students in the Graduate School of Arts and Sciences and the College of Liberal and Professional Studies. The email, sent via official student listservs at the end of March 2020, invited students to take advantage of “an online tool grounded in behavioral science” and mentioned that “this is an option, not an obligation.” The email also included a link to the intervention, hosted on Qualtrics. Based on estimates provided by the university, we expect that approximately 3,000 students received the invitation. To maximize the reach of the intervention, all graduate and professional students were eligible to participate; there were no exclusion criteria. In the present study, we analyze responses from the first week of recruitment (i.e., March 30 to April 6).

## Procedure

Upon opening the Qualtrics link, participants were directed to a brief introductory screen with information about the study’s purpose and a general description of the activities. Participants then filled out a brief baseline questionnaire with measures of depressive symptoms, anxiety symptoms, secondary control, and perceived ability to handle the COVID-19 crisis (described in further detail below). Once the baseline questionnaire was completed, participants were randomized to receive two of the three intervention modules described above. Module order was also randomized, resulting in six possible combinations of the three modules (i.e., 1/6 of participants received cognitive restructuring followed by gratitude while 1/6 received gratitude followed by cognitive restructuring, etc.). After each intervention module, participants were asked to rate the module on acceptability, perceived helpfulness, engagement, and applicability. After completing both modules, participants filled out a brief post-intervention questionnaire, including some of the pre-intervention measures, feedback questions about the intervention, and demographic information (described in detail below). Upon finishing the intervention, participants received an automated email encouraging them to continue practicing



the activities they performed; the email included worksheets to help them practice. Because our primary intention was to provide support to students in light of the pandemic, we chose not to include a control group or require participants to complete follow-up assessments. With this in mind, we applied for Quality Assurance/Quality Improvement approval from the Institutional Review Board (see **Supplementary Materials** for details). Study procedures were reviewed and deemed quality improvement by the University of Pennsylvania Institutional Review Board.

## Measures

### Baseline Measures

#### *Depressive symptoms (patient health questionnaire-2)*

The Patient Health Questionnaire-2 (PHQ-2; Kroenke et al., 2003), a commonly used measure of depression, was administered to participants at baseline. The PHQ-2 asks participants to report the frequency of depressed mood and anhedonia over the past 2 weeks. Each item is scored from 0 (“not at all”) to 3 (“nearly every day”). The PHQ-2 has demonstrated strong psychometric properties, including construct validity. PHQ-2 scores are associated with functional impairment, symptom-related difficulties, and clinician ratings of depression (Kroenke et al., 2003). Cronbach’s alpha in our sample was 0.8.

#### *Anxiety symptoms (generalized anxiety disorder-2)*

The Generalized Anxiety Disorder 2-item scale (GAD-2; Kroenke et al., 2007), a commonly used measure of anxiety, was administered to participants at baseline. The GAD-2 asks participants to report the frequency of anxiety and inability to stop worrying over the past 2 weeks. Each item is scored from 0 (“not at all”) to 3 (“nearly every day”). The GAD-2 has demonstrated strong psychometric properties, including construct validity. GAD-2 scores are associated with functional impairment, and clinician ratings of anxiety (Plummer et al., 2016). Cronbach’s alpha in our sample was 0.87.

### Post-module Measures

#### *Acceptability and perceived utility*

After each module, participants were asked to complete the Acceptability of Intervention Measure (AIM; Weiner et al., 2017). The items of the AIM prompt participants to rate the degree to which they approved of, welcomed, liked, and found a module appealing. Participants respond to the four items on a 5-point Likert scale, ranging from 1 (completely disagree) to 5 (completely agree). The four ratings are averaged to yield an acceptability score (Weiner et al., 2017).

We also administered three items to assess the perceived helpfulness, engagement, and applicability of each intervention module. Item wording was adjusted depending on the modules that participants received. For instance, participants who received the behavioral activation module were asked to rate the following statements: “I found the positive activities exercise helpful,” (perceived helpfulness), “I found the positive activities exercise engaging,” (engagement), and “I think I will continue applying content from the positive activities exercise in the weeks ahead”

(applicability). Each item was rated on a 7-point Likert scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree.”).

### Pre- and Post-intervention Measures

#### *Secondary control (secondary control scale)*

Secondary control refers to individuals’ perceived ability to manage the personal or psychological impact from objective conditions or events (Weisz et al., 2010). Secondary control has been contrasted with primary control, the ability of individuals to influence objective conditions or events in their lives (Rothbaum et al., 1982). Secondary control may be especially important during times of crisis, when individuals have relatively less primary control over their objective situations. For example, individuals during the COVID-19 crisis do not have much control over where they can travel or whom they can visit (primary control). However, they are able to control how they respond to the pandemic and the lifestyle changes caused by social distancing (secondary control).

To assess secondary control, we adapted three items from the Secondary Control Scale for Children (SCSC; Weisz et al., 2010), which we administered at baseline and post-intervention. The SCSC asks participants to rate the extent to which various statements are true about how they react to negative events. Each item is scored on a 4-point Likert scale from 0 (“very false”) to 3 (“very true”). Although the scale was initially designed for youth and adolescents, it contains items that are relevant across age groups. To reduce participant burden and to ensure that the questions were relevant to our sample of graduate and professional students, we selected three items from the SCSC (see **Supplementary Materials**). The SCSC has demonstrated strong psychometric properties in samples of youth and adolescents (Weisz et al., 2010; Schleider and Weisz, 2018). Cronbach’s alpha for the three items in our sample was 0.74.

#### *Ability to handle COVID-19 and perceived impact*

We developed and administered three questions relating to the COVID-19 pandemic. The first two questions were administered at baseline and post-intervention. The first question asked participants about their perceived ability to handle lifestyle changes that result from the COVID-19 crisis (“Over the next 2 weeks, I think I will be able to handle lifestyle changes that have resulted from the coronavirus pandemic”). The second asked participants to predict the impact of the coronavirus on their overall quality of life (“Over the next 2 weeks, I think the pandemic will have an extremely negative impact on my quality of life”). Both statements were rated on a 7-point Likert scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”).

### Post-intervention Measures

#### *Ability to handle challenges relating to COVID-19*

A third question about COVID-19, administered post-intervention only, asked participants if they believed that the content in the program could help them handle challenges relating to coronavirus (“I think the content covered in this program could help me handle challenges related to the coronavirus over the next few weeks.”). This statement was also

rated on a 7-point Likert scale ranging from “strongly disagree” to “strongly agree.”

### Demographic information

Participants were asked to report their biological sex, sexual orientation, race, economic class, and mental health history. To avoid biasing participants' responses to other questionnaires, we included the demographic questions at the end of the survey. When developing our items and response options, we followed guidelines on best practices for assessing demographic characteristics (see Hughes et al., 2016).

## Analytic Plan

Below, we describe our analyses. All analyses were planned prior to beginning data analysis. Because our primary goal was to examine the potential of the online single-session intervention delivery format (as opposed to specific content modules), we pooled the data from each intervention condition (behavioral activation/cognitive restructuring, behavioral activation/gratitude, and cognitive restructuring/gratitude). Potential differences between conditions will be examined in a future report.

### Sample Characterization and Usage Patterns

To assess usage patterns with the single-session intervention, we report the number of students who encountered the first screen of their first module (“starters”). Starters are divided into “completers” (people who finished both of the modules assigned to them) and “non-completers” (people who completed only one module or zero modules). Completion rate is the proportion of completers to starters. We also report the number of times the Qualtrics link was clicked. However, because an individual could have clicked the link multiple times, this number does not represent the number of individuals who clicked the link.

We report the symptom levels for completers ( $n = 189$ ) and non-completers ( $n = 74$ ). As demographic information was obtained from participants after they completed both modules, we only have demographic information for completers. Fifteen completers chose not to provide demographic information.

To assess whether completion of intervention was related to reported levels of depressive symptoms, anxiety symptoms, or secondary control, we conducted independent samples  $t$ -tests comparing completers and non-completers.

### Acceptability and Perceived Utility

Acceptability was measured after each module. Thus, completers filled out two sets of acceptability ratings (one for each of the two modules they received), while some non-completers (those who completed one module) filled out one set of acceptability ratings. For completers, we averaged the acceptability scores across the two modules that they rated. For non-completers who completed one module, we used the score from the one module they rated. Drawing from previous research on single-session interventions (Schleider et al., 2020), we operationalized mean scores  $>3$  as overall perceived single-session intervention acceptability.

To evaluate potential group-level differences in acceptability ratings, we examined the association between acceptability and

sex, race, sexual orientation, age, economic class, depressive symptoms, anxiety symptoms, and secondary control. We also compared acceptability ratings between completers and non-completers.

Helpfulness, engagement, and applicability were also assessed after each module. We treated the ratings by completers and non-completers in the manner described above for acceptability. We report the mean score and standard deviation for each of the three items relating to helpfulness, engagement, and applicability. Because scores were highly correlated (all  $r_s > 0.70$ ), we combined these items into a single variable, which we refer to as “perceived utility.” To evaluate potential group-level differences in perceived utility, we conducted the same analyses described above for acceptability.

### Secondary Control

We computed paired sample  $t$ -tests and estimated within-group effect sizes (Cohen's  $d$  with 95% confidence intervals) to assess reported changes on secondary control from pre-intervention to post-intervention. Following guidelines by Lakens (2013), we calculated the pre–post effect sizes using two methods. We report both  $d_{av}$  (which does not take into account correlations between pre- and post- program measures) and  $d_z$  (which accounts for correlations between pre- and post- program measures).

### Questions About COVID-19

For the two questions about COVID-19 administered pre- and post-intervention, we used the same process described above for secondary control. Because the two COVID-19 questions were conceptually distinct (one asked about ability to handle COVID-related problems and one asked about the perceived impact of COVID-19), we computed separate effect sizes for the two COVID-19 questions.

For the question about the perceived impact of the intervention on participants' ability to handle coronavirus-related challenges, which was administered post-intervention only, we report the mean, standard deviation, and % endorsement (scores  $> 4$ ).

### Missing Data

We used all available data for each analysis described above. Because one of our aims involved examining attrition, missing data are reported but not imputed. Missing data for analyses were handled via pairwise deletion.

## RESULTS

### Sample Characteristics and Usage Patterns

From 3/30/20 to 4/6/20, our survey link received 561 clicks. 263 individuals completed pre-test questions and were assigned to an intervention. Of these, 189 individuals completed both modules of the single-session intervention, yielding an overall completion rate of 72% among those who were assigned to an intervention. Demographic characteristics for completers are presented in **Table 1**.

**TABLE 1** | Sample demographics.

	<i>M (SD) or N (%)</i>
<i>N</i> (completers)	189 (100%)
PHQ-2	1.98 (1.65)
GAD-2	2.61 (1.86)
Age	31.04 (8.91)
<b>Race/ethnicity</b>	
White	114 (66.67%)
Asian	41 (23.98%)
Hispanic/Latinx/Spanish Origin	12 (7.02%)
Black	11 (6.43%)
Middle Eastern or North African	3 (1.75%)
Other	2 (1.17%)
Missing	18
<b>Sex</b>	
Female	127 (72.99%)
Male	42 (24.14%)
Other	2 (1.15%)
Prefer not to answer	3 (1.72%)
Missing	15
<b>Sexual orientation</b>	
Heterosexual or straight	140 (81.40%)
Bisexual	16 (9.30%)
Queer	10 (5.81%)
Fluid	6 (3.49%)
Gay or Lesbian	5 (2.91%)
Pansexual	5 (2.91%)
Demisexual	3 (1.74%)
Questioning	3 (1.74%)
Prefer not to answer	5 (2.91%)
Missing	17
<b>Social class (self-reported)</b>	
Poor	5 (2.89%)
Working class	27 (15.61%)
Middle class	111 (64.16%)
Affluent	30 (17.34%)
Missing	16
<b>Experienced a mental illness (self-reported)</b>	
Yes	72 (41.62%)
Unsure	22 (12.72%)
No	79 (45.67%)
Missing	16

Participants could select multiple options for race and sexual orientation.

Qualtrics records the amount of time that individuals spend on the survey. Among completers, the median time spent on the program, inclusive of all questionnaires, was 39.2 min (1st quartile = 26.7 min). However, participants were not prevented from multitasking or taking a break while completing the survey, and they had to complete the questionnaires in addition to the modules. Thus, the Qualtrics figures represent an overestimate of the time required to complete the intervention.

To describe our sample, we provide completers' and non-completers' reports of depressive symptoms [completers:

$M = 1.98$ ,  $SD = 1.65$ ; non-completers:  $M = 2.07$ ,  $SD = 1.87$ ;  $t(115.55) = -0.34$ ,  $p = 0.73$ ,  $d = -0.05$ ] and anxiety symptoms [completers:  $M = 2.61$ ,  $SD = 1.86$ ; non-completers:  $M = 2.92$ ,  $SD = 2.03$ ;  $t(119.12) = -1.12$ ,  $p = 0.27$ ,  $d = -0.16$ ]; differences between completers and non-completers were not statistically significant. Applying scoring guidelines for the PHQ-2 (using a cutoff score of 3), 30% of the completers and 36% of non-completers would screen positive for likely clinical depression. Applying scoring guidelines for the GAD-2 (using a cutoff score of 3), 42% of the completers and 47% of non-completers would screen positive for likely clinical anxiety.

## Acceptability and Perceived Utility

**Table 2** shows participants' ratings of acceptability, perceived helpfulness, engagement, and applicability.

We compared ratings on the acceptability metric (the AIM) between completers and non-completers. Because non-completers only had AIM ratings available for one module (the first module they were assigned), we used completers' scores on their first module for the comparison.

Acceptability ratings are provided for the first module participants received (completers:  $M = 4.14$ ,  $SD = 0.76$ ; non-completers:  $M = 3.96$ ,  $SD = 0.79$ ); differences between completers and non-completers were not statistically significant [ $t(28.86) = 1.09$ ,  $p = 0.29$ ,  $d = 0.24$ ]. For completers, ratings on the first module they completed were not statistically significantly different than ratings on the second module they completed;  $M = 4.19$ ,  $SD = 0.77$ ;  $t(179) = -0.83$ ,  $p = 0.41$ ,  $d = -0.06$ . 95% of completers and 83% of non-completers provided acceptability ratings that averaged greater than 3.0, with completers more likely to have scores above a 3;  $X^2(1, N = 209) = 4.31$ ,  $p = 0.04$ .

Differences in acceptability were not statistically significant by sex, race, sexuality, age, economic class, depressive symptoms, or anxiety symptoms (all  $ps > 0.17$ ). There was a weak association between secondary control at baseline and acceptability ratings. Individuals with greater secondary control at baseline reported slightly higher acceptability scores;  $r(207) = 0.21$ ,  $p = 0.002$ . To investigate this further, we applied a linear regression; we

**TABLE 2** | Acceptability and feedback ratings on single-session intervention.

	<b>Completers (<i>n</i> = 185) <i>M</i> (<i>SD</i>)</b>	<b>Non-completers with available data (<i>n</i> = 24) <i>M</i> (<i>SD</i>)</b>
<b>Acceptability items (range: 1–5)</b>		
Approve	4.18 (0.68)	4.00 (0.82)
Like	4.14 (0.69)	3.88 (0.90)
Welcome	4.23 (0.69)	3.88 (0.90)
Appeals	4.12 (0.70)	4.00 (0.76)
Average acceptability score	4.17 (0.65)	3.96 (0.79)
<b>Perceived utility items (range: 1–7)</b>		
Helpful	5.73 (1.01)	5.52 (1.19)
Engaging	5.57 (1.07)	5.48 (1.08)
Applicable	5.67 (0.97)	5.48 (1.08)
Average perceived utility score	5.66 (0.93)	5.49 (1.06)

**TABLE 3** | Changes from pre-intervention to post-intervention in secondary control and COVID-related questions.

Construct	Baseline		Post-intervention		Paired sample t-test results				
	M	SD	M	SD	p-value	Mean difference	CI	$d_{av}$	$d_z$
Secondary control (range: 0–9)	6.01	1.82	6.64	1.64	<0.001	0.63	[0.44, 0.82]	0.36	0.50
Negative impact of COVID-19 crisis (range: 1–7)	3.94	1.61	3.60	1.53	<0.001	0.35	[0.15, 0.55]	0.22	0.25
Ability to handle COVID-related lifestyle changes (range: 1–7)	5.50	1.25	5.64	1.05	0.066	0.14	[-0.01, 0.29]	0.13	0.14

found that a one-point increase on the secondary control scale was associated with an increase on the AIM of 0.08 points. The intercept was 3.69, suggesting that an individual with a score of 0 on the secondary control scale would still be predicted to rate COMET as acceptable. Additionally, at each level of secondary control (ranging from 1 to 9 in our sample), the majority of participants reported an acceptability score greater than three. Thus, while there was a significant association between secondary control and acceptability, even participants reporting lower levels of secondary control tended to view the COMET modules as acceptable.

Participants generally reported favorable ratings (i.e., >4) on the perceived utility items: perceived helpfulness (completers:  $M = 5.73$ ,  $SD = 1.01$ ; non-completers:  $M = 5.52$ ,  $SD = 1.19$ ), engagement (completers:  $M = 5.57$ ,  $SD = 1.07$ ; non-completers:  $M = 5.48$ ,  $SD = 1.08$ ), and applicability (completers:  $M = 5.67$ ,  $SD = 0.97$ ; non-completers:  $M = 5.48$ ,  $SD = 1.08$ ). We also calculated the percentage of participants who endorsed the modules (i.e., mean score > 4) as helpful (90% of completers and 76% of non-completers), engaging (86% of completers and 84% of non-completers), and applicable (89% of completers and 76% of non-completers).

As mentioned, due to the high correlation between these items, we combined these items into one variable (the perceived utility score) to reduce the number of tests we performed. We calculated perceived utility ratings for the first module participants received (completers:  $M = 5.61$ ,  $SD = 1.00$ ; non-completers:  $M = 5.49$ ,  $SD = 1.06$ ); differences between completers and non-completers were not statistically significant [ $t(30.07) = 0.53$ ,  $p = 0.60$ ,  $d = 0.12$ ]. For completers, ratings on the first module they completed were not statistically significantly different than ratings on the second module they completed;  $M = 5.71$ ,  $SD = 1.15$ ;  $t(180) = -1.13$ ,  $p = 0.26$ ,  $d = -0.09$ . Differences in perceived utility were not statistically significantly different by sex, race, sexuality, age, economic class, depressive symptoms, anxiety symptoms, or completion status (all  $ps > 0.37$ ). Individuals with greater secondary control at baseline reported slightly higher perceived utility scores;  $r(208) = 0.21$ ,  $p = 0.002$ . The trend described above for acceptability was also found for perceived utility; at each level of secondary control (ranging from 1 to 9 in our sample), the majority of participants reported an acceptability score greater than four. 92% of completers and 84% of non-completers provided perceived utility ratings that averaged greater than 4.0, and there were no statistically significant differences between completers and non-completers;  $X^2(1, N = 210) = 1.67$ ,  $p = 0.20$ .

## Changes in Secondary Control

Table 3 shows the results of our paired sample t-tests and effect sizes for the measures delivered at both baseline and post-intervention. Completers reported a statistically significant improvement in secondary control from pre-intervention to post-intervention;  $t(173) = -6.53$ ,  $p < 0.001$ . Secondary control scores were greater post-intervention ( $M = 6.64$ ,  $SD = 1.64$ ) than pre-intervention ( $M = 6.01$ ,  $SD = 1.82$ ), with moderate standardized effect sizes ( $d_{av} = 0.36$ ,  $d_z = 0.50$ ).

## Changes in COVID-19 Questions

Completers reported improvements in the perceived impact of the COVID-19 crisis on their quality of life from pre-intervention to post-intervention. Participants were less likely to endorse the statement that the COVID-19 crisis would have an extremely negative impact on their quality of life post-intervention ( $M = 3.60$ ,  $SD = 1.53$ ) than pre-intervention ( $M = 3.94$ ,  $SD = 1.61$ ), with small standardized effect sizes ( $d_{av} = 0.22$ ,  $d_z = 0.25$ ). This difference was statistically significant;  $t(178) = 3.51$ ,  $p < 0.001$ . Completers also reported improvements in their perceived ability to handle COVID-related changes from pre-intervention to post-intervention. Participants were slightly more likely to endorse the statement that they would be able to handle COVID-related changes post-intervention ( $M = 5.64$ ,  $SD = 1.05$ ) than pre-intervention ( $M = 5.50$ ,  $SD = 1.25$ ), with small standardized effect sizes ( $d_{av} = 0.13$ ,  $d_z = 0.14$ ). However, this difference did not meet the threshold for statistical significance;  $t(178) = 1.85$ ,  $p = 0.066$ .

Finally, 88% of completers believed that the content covered in the program could help them manage challenges relating to the COVID-19 crisis ( $M = 5.67$ ,  $SD = 1.17$ ).

## DISCUSSION

Overall, our findings demonstrate that brief online interventions, such as COMET, can be a feasible and useful way to provide support to individuals during the COVID-19 crisis. One major benefit of such interventions is that they are flexible; they can be modified and updated regularly. This is possible even under time constraints; responding to the COVID-19 crisis, our small team was able to adapt an existing online intervention over the course of just 2 weeks. The flexibility of single-session interventions allows them to be rapidly deployed in times of crisis. Once deployed, these interventions can quickly reach large numbers of people. In just 1 week, 263 individuals began and 189 individuals completed COMET. We not only found that



many graduate and professional students were interested in the single-session intervention and willing to complete it, but also that they rated COMET highly on acceptability and perceived utility. Furthermore, acceptability ratings and perceived utility ratings did not differ by reported depressive symptoms or anxiety symptoms; COMET appears to be welcomed by individuals with elevated mental health symptoms as well as those without. Acceptability ratings differed slightly by secondary control. Individuals with higher secondary control—the sense that they can control their reactions to objective circumstances—tended to provide slightly higher ratings of acceptability. This finding might be explained by the fact that individuals who believe they can handle their own responses may be more likely to like programs that promote agency in responding to objective circumstances.

Our findings also provide preliminary data suggesting that these interventions can be helpful during times of crisis. Participants reported greater levels of secondary control post-intervention, which may be especially important during the COVID-19 crisis. Perceived primary control (the belief individuals can influence objective events and circumstances in their life) and secondary control are protective factors for the development of mental health problems (Rothbaum et al., 1982; Weisz et al., 2010). However, while individuals have some control over the protective measures they take against COVID-19 (such as staying in their homes and avoiding gatherings), the crisis has limited the ability of people to influence their objective social, emotional, academic, and economic circumstances. COVID-19 has made it difficult or impossible for individuals to safely visit their loved ones, protect those who are exposed to the virus, keep their jobs, and maintain their daily routines. More broadly, individuals have little control over how long the pandemic will last, how the economy will change, or how the virus will affect the health and lives of their loved ones. In this context, we believe that secondary control, the tendency to believe that one can cope with stressful situations even when one has little control over the outcomes, will be especially important during the crisis. Interventions that improve perceived secondary control will be essential public health tools in the months ahead.

As we have emphasized, it is also important to evaluate the acceptability, implementation, and uptake of such interventions. Unfortunately, as mentioned previously, few digital interventions have demonstrated acceptability and uptake in real-world settings (Fleming et al., 2018; Buss et al., 2020). Drop-out rates in open trials of digital interventions are high (Fleming et al., 2018), users rarely spend more than a few minutes on digital mental health interventions (Baumel et al., 2019), and most publicly available mental health apps generally fail to retain users (Wasil et al., 2020e). With this in mind, some of our findings are especially promising. Individuals enrolled in our intervention over a short timeframe, considered our intervention acceptable, and believed our intervention was helpful, engaging, and applicable to their lives. Identifying specific strategies that led to high acceptability, especially strategies that could be replicated in future mental health promotion efforts, could be highly valuable.

There are a few unique aspects of our process that may have led to favorable acceptability ratings and uptake. First, we intentionally advertised COMET as a program that all students could benefit from. Drawing from work in low- and middle-income countries (e.g., Osborn et al., 2019), we reasoned that branding our intervention as a program that anyone could benefit from could circumvent some of the stigma associated with help-seeking for psychiatric disorders. Consequently, rather than mentioning depression or anxiety, we branded the intervention as one that could help individuals “adjust to changing life circumstances, manage emotions, and achieve goals”. Furthermore, rather than referring to two of the modules as “behavioral activation” and “cognitive restructuring”—technical terms that may be associated with formal psychotherapy—we relabeled these sections as “positive activities” and “flexible thinking.” Future research could examine different ways to present and advertise these or other evidence-based intervention modules. Such research could draw from work on the direct-to-consumer marketing of mental health interventions (Becker, 2015; Rith-Najarian et al., 2019b).

Our partnership with university deans was also essential. As a result of this partnership, information about our intervention was distributed to a wide array of students across the university. Additionally, since the recruitment messages were sent out using the official student listservs (which are often used for important communications), students may have been more likely to notice and open the message. In these ways, our findings showcase the potential utility of partnerships between researchers and university administrators. Finally, it is important to note that the COVID-19 crisis may have impacted our recruitment efforts. Students may be especially interested in developing skills that can help them cope with lifestyle changes as a result of the crisis. Additionally, due to social distancing and online learning, some students may have more free time than they normally do during the semester, which may have made them more responsive to our web-based intervention.

Our findings also have implications for public health officials, higher education leaders, and intervention developers interested in supporting people during the COVID-19 crisis. For example, our promising findings regarding students' experiences with COMET could encourage future collaborations between psychologists and higher education leaders. While such partnerships can be time-consuming and effortful, they are worthwhile to pursue when there is reason to believe that they will be impactful. This is especially true for collaborations around topics that could be considered sensitive, like programs relating to mental health. When we launched our collaboration, our team and our collaborators did not know if or how students would engage with our program. Our experience offers some room for optimism, showing that such collaborations can be fruitful, and students appear highly receptive to university-endorsed online mental health initiatives. With this in mind, we hope our findings encourage psychologists and higher education leaders at other universities to engage in student mental health promotion initiatives during the COVID-19 crisis. Individuals considering such

collaborations or interested in developing interventions may benefit from adapting content from pre-existing interventions or common elements from empirically supported interventions (see Chorpita and Daleiden, 2009; Weisz et al., 2012). In our experience, the decision to adapt existing modules (rather than to create a new intervention from scratch) allowed us to act quickly while ensuring that individuals received content with strong empirical support. From a public health perspective, repurposing existing interventions may provide a quick and efficient way to expand access to support. Additionally, modular interventions may be especially valuable given their flexibility and adaptability (Weisz et al., 2012). As an example, COMET was adapted for graduate and professional students over the course of a few weeks. COMET, or other modular interventions, could also be readily adapted for additional populations. New modules (e.g., mindfulness and problem solving) could be added, existing modules could be removed, or different combinations of modules could be deployed depending on the needs of specific populations. Finally, our findings highlight that students of a variety of age groups and backgrounds are interested in online self-help interventions. With this in mind, higher education leaders could consider launching low-intensity interventions to support students across the country.

Our findings should be interpreted in light of some limitations. First, our pre-post design is not sufficient to make causal claims, and our study does not remove the need for randomized control trials. It remains unknown if our intervention can produce lasting changes in participants' thoughts, behaviors, or feelings. In order to gauge those effects, there is a need for adequately-powered pre-registered randomized controlled trials which measure mental health outcomes (e.g., depressive and anxiety symptoms) longitudinally. Second, the rates of depressive symptoms and anxiety symptoms identified in our study should be interpreted within the context of COVID-19. Participants' reports of depression and anxiety may be higher than normal due to the stressors and lifestyle changes introduced by the crisis. For some individuals, these symptoms may be temporary, but for others, they may last beyond the crisis; future longitudinal and observational research would be useful to examine these trends. Third, while our sample was diverse along several dimensions, participants in our study were predominantly female. This is consistent with previous research; a recent review documented that most studies of prevention programs for college students and graduate students had samples that were two-thirds or more female (Rith-Najarian et al., 2019a). Such findings call for the development of recruitment techniques that may make digital interventions more appealing to male students (e.g., Rith-Najarian et al., 2019b). Fourth, in order to minimize participant burden and maximize the reach of our survey, our demographic questionnaire was brief. As a result, we did not comprehensively assess contextual factors that may be highly relevant during the COVID-19 crisis, such as participants' living situations, income, marital status, social support, or parental status. Future research is needed to understand contextual risk factors and protective factors

that may influence how students are affected by COVID-19. Additionally, future research could evaluate if psychosocial interventions can support students who are especially vulnerable during the crisis. Finally, participants in our study received pre-program and post-program questionnaires before being assigned to an intervention condition, making it difficult to estimate the exact amount of time that participants spent completing intervention content. Furthermore, it is possible that our baseline questionnaires deterred some individuals from engaging. If our intervention had not included baseline questionnaires, it is possible that it would have reached more students.

Overall, our findings suggest that brief digital interventions could be a useful way to expand access to care in times of public health emergencies such as the COVID-19 crisis. Students appear interested in these interventions, complete them at high rates, and find them helpful. Participants also reported improvements in their perceived sense of control and ability to handle the pandemic from pre- to post-intervention. Future research is needed to understand which content is best suited for brief interventions, which content is best suited for specific circumstances (e.g., public health emergencies), how such interventions should be ideally presented and disseminated, and for whom these interventions are most effective. Such research could ensure that the important findings and interventions from psychological science are successfully disseminated to the broader public, especially during public health emergencies like the COVID-19 pandemic.

## DATA AVAILABILITY STATEMENT

The datasets generated for this study are not readily available because the authors did not receive clearance to share the data collected for this project. The R code associated with this project has been made available as a **Supplementary Material**. Requests to access the datasets should be directed to AW, [wasil@sas.upenn.edu](mailto:wasil@sas.upenn.edu).

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Pennsylvania Institutional Review Board. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

AW conceptualized the idea for the study with RD. AW and MT designed the initial versions of the interventions with guidance from RD. RF and JS participated in the adaptation of the interventions. AW performed data analysis with oversight from RD and support from MT, RF, and JS. AW wrote the initial R script. RF, MT, and JS reviewed and revised

the script. AW wrote the initial draft of the manuscript. MT, RF, JS, and RD revised the manuscript. All authors contributed to the article and approved the submitted version.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.569785/full#supplementary-material>

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# Psychological Lockdown Experiences: Downtime or an Unexpected Time for Being?

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The spread of COVID-19 in Italy resulted in the implementation of a lockdown that obligated the first time the general populace to remain at home for approximately two months. This lockdown interrupted citizens' professional and educational activities, in addition to closing shops, offices and educational institutions. The resulting changes in people's daily routines and activities induced unexpected changes in their thoughts, feelings and attitudes, in addition to altering their life perceptions. Consequently, the present study explores how young adults perceived their lives under lockdown during the final week of March 2020, when the reported number of daily coronavirus infections reached its peak in Italy. The research was carried out among 293 university students (234 women and 59 men) with an average age of 20.85 years old (SD = 3.23). The researchers asked participants to describe the emotions, thoughts and experiences that characterized their time under lockdown. The study analyzed specific narratives related to time and space using grounded theory methodology, which was applied using Atlas 8 software, leading to the creation of 68 codes. The study organized these codes into three specific categories: confined in the present, confined in the past, and striving toward one's goals. Finally, the researchers also created a core-category labeled "continuity of being." The results showed that the closure of open spaces caused a division in participants' perceptions of time continuity, with many viewing themselves as feeling fragmented and as living the present in a static and fixed way. Additionally, participants also saw the present as being discontinuous from the past, while, simultaneously, projecting toward the future and the changes it might bring. Finally, this study examined further implications surrounding individual projecting among young people in greater depth.

**Keywords:** time, lockdown, storytelling, well-being, young adults, confined in the present, confined in the past, striving toward one's goals

## INTRODUCTION

The first COVID-19 emergency lockdown in Italy was in place from March 9 to May 4, 2020. During this period, the daily lives of Italians were turned completely upside down, as various government decrees restricted routine educational, professional and social activities. Recent studies on the COVID-19 emergency have highlighted that forced isolation has had a great impact on people's psychological condition (Brooks et al., 2020; Duan and Zhu, 2020; Pancani et al., 2020).

In particular, many studies have focused on the lockdown's impacts on children and adolescents (Orgilés et al., 2020), women vulnerable to domestic violence (Troisi, 2020) and students distress (Cao et al., 2020; Zurlo et al., 2020). Particularly, Di Napoli et al. (2021) and Migliorini et al. (2021) described that students' individual feelings were characterized by fear, distress, sadness, rage, and loneliness, which are detailed in conjunction with coping strategies and resilience, as well as interpersonal relations at the familial and institutional levels (Marzana et al., 2021).

Further variables associated with higher levels of depression, anxiety and stress were female gender, negative affect and detachment (Mazza et al., 2020) but people with more resilient coping strategies were more likely to experience fewer depressive symptoms (Roma et al., 2020a).

Moreover, psychological factors, such as self-efficacy, risk perception and civic engagement, had a central role in the adherence to the measures adopted by the institution to contain the spread of the virus (Roma et al., 2020b).

New individual and social insights about "we-ness" awareness arise (Walker et al., 2020), strengthening solidarity, connectedness and shared experiences of "we-ness," and improving individual and community well-being (Procentese et al., 2020; Di Napoli et al., 2021).

However, no known studies have investigated how the pandemic has affected people's subjective perceptions of time.

As observed in the biographies of those who have lived through experiences such as spending time in prison, forced confinement influence one's perceptions of time. For example, in his biography, Nelson Mandela (1994) sheds light on his many years in prison, describing how, even in the worst detention, he never gave up on his dreams and hopes for freedom, while constantly developing plans for future action. Indeed, many psychological researchers have investigated individuals' attitudes toward temporal perspectives. For example, Stolarski et al. (2018) examined the long history of time and its deep roots in philosophy and physics. Additionally, Zimbardo and Boyd (2015) defined time perspectives as individual subjective experiences through which each person refers to the psychological concepts of the past, present and future. Zimbardo and Boyd (2015) specifically elaborated five individual attitudes toward time, encompassing future, past-negative, past-positive, present-hedonistic, and present-fatalistic, which are correlated with differing levels of well-being. In particular, individuals possessing past-positive and present-hedonistic time perspectives are thought to have higher levels of well-being, while future time perspectives are associated with optimism, hope and an internal locus of control.

More recently, Prilleltensky et al. (2015) proposed a concept of well-being specifically measured using a temporal perspective, assuming that individual perceptions of well-being cannot ignore experiences from the past, those perceived in the present and those imagined in the future (Di Martino et al., 2018; Di Napoli et al., forthcoming). Moreover, the seminal contribution of Pichon-Rivière on time and space in everyday life pointed out that everything that happens in daily life takes place in a given space and at a given time. Furthermore, as expressed by

Quiroga and Racedo, these routine events possess a "rhythm" that is shaped by "the complex social relationships that govern the life of human beings in a certain historical era" (2012, p.18). In addition, external events alter how time and space frame individuals' daily lives and undermine our concrete conditions of existence. However, "only when everyday life hurts us, when there is no more pleasure or when we experience a crisis, [do] we start to think about it" (Quiroga and Racedo, 2012, p.18).

In principle, from an ecological perspective, individual dimensions and social events influence behaviors, as every external change modifies people's reference frameworks, and, in turn, these changes alter one's internal world and their world perceptions (Lewin, 1943). Earlier research has considered how particular sudden and unexpected events, such as serious illnesses, natural disasters, terrorist attacks, wars, geographical relocation or temporary time constraints influence time perspectives (e.g., Fung et al., 1999; Fung and Carstensen, 2004). Indeed, some studies have found that well-being is also strictly related to subjective experiences of these events (Petrillo et al., 2014). From a phenomenological point of view, illness, as with any other critical event, causes a break in one's sense of continuity, in addition to dramatic experiences of discontinuity. This perspective underlines a crisis of the subject's sense-making systems and the necessity to pursue meaning, in order to interpret ongoing experiences. Moreover, critical events and illness represent elements of discontinuity that saturate the present and the entirety of sense-making processes. During the perturbation phase, time is organized through extremely subjective modalities, appearing to be confusing and inconsistent at first glance. However, a deeper analysis regarding the effects of illness on time perceptions, such as the dyscrasia of the temporal order, indicates that time perceptions are the result of the ongoing sense-making processes concerning what is happening at that moment. In this regard, how illness affects time perceptions involves not only meaning construction in response to the rupture of canonical states, but also a separate process of crisis subjectification. In other words, illness-influenced time perceptions result in significant sense-making processes aimed at the construction of these perceptions (Freda et al., 2015, p. 209). As an example, people with chronic diseases when they suffer the unpredictable vulnerability of their illness are considering their selves under the Damocles Syndrome, in allusion to the Greek mythological tale about an imminent and ever-present peril (Gonzalez Leone et al., 2019). Consequently, i.e., oncology patients are worried and anxious about eventual cancer recurrence comprising a second pathology related to impending distress or possible danger that may materialize at an unknown time in the future.

Concerning natural disaster-related emergencies, such as floods, earthquakes and pandemics, common sense reflections emphasize their catastrophic aspects. However, these circumstances take also on unexpected dimensions, such as changes in relational and time perspectives. Consequently, significant external events cause time and space new perceptions, reconstructing individuals' inner worlds and their connections with their environmental frameworks.

In addition, according to the community psychology perspective utilized by the present study, space and time are both framed also by environmental, social and relational circumstances (Orford, 2008).

## Future Time Perceptions

Through-out life, people must adapt to circumstances that require the integration of new life events and changes (Kralik et al., 2006). Subjectively perceiving future time is essential because it is associated with one's choice of goals, objectives and preferences (Carstensen et al., 1999) at different ages (Donizzetti, 2019).

Life transition events lead to changes in time perceptions (Wittmann and Lehnhoff, 2005), especially those regarding the future (Carstensen et al., 1999).

In particular, life transitions are moments where time continuity is broken because of changes in temporal perspectives that result in a division between past experiences and future plans.

This implies that young adults seek information and knowledge regarding social goals, in order to maximize their future opportunities. Young adulthood is in fact characterized by new identity exploration and development and is often coupled with significant life changes, such as entering the labor market, achieving financial independence and establishing long-term intimate relationships (Arnett, 2000; Crocetti et al., 2012). This transition to adulthood is also imbued with optimism, given young adults' enhanced capacity to explore the world and envisage new life trajectories (Larson et al., 2002; Arnett, 2007). On the contrary, time perceptions among the elderly are more limited. Elderly individuals have limited time perceptions and are more motivated to pursue emotion-focused goals (Carstensen et al., 2006; Charles and Carstensen, 2010).

However, in the words of Rosa (2003), Italian youth's existence has also become de-temporalized, as "Life is no longer planned along a line that stretches from the past into the future; instead, decisions are taken from 'time to time' according to situational and contextual needs and desires" (p.19).

Therefore, listening to the voices of Italian youth during the peak of the unexpected COVID-19 pandemic let researchers deepen their understanding of how time perceptions could affect young people confined at home, who generally already perceived the future in uncertain, accelerated and fragmented terms (Leccardi, 2005).

To better understand time perceptions and representations during the lockdown, we conducted a research with Italian university students to document their personal experiences of this unexpected and unforeseen event.

From this perspective, understanding young adults' time perceptions while being confined at home due to the COVID-19 pandemic would provide valuable contributions to the existing literature.

In this light, the present article seeks to expand upon the existing research, by elaborating upon the effects of the COVID-19 lockdown on young Italian students' psychological perceptions of time.

This study analyses students' reports regarding their personal lives during home confinement. Generally, time is "taken into account in terms of life events and life experiences and, therefore, refers to a life-course perspective that is often processed in retrospect" (Kieslinger et al., 2020, p.1). In this case, however, our participants presented their present perceptions of their lives during forced confinement at home. Therefore, their perspectives represented a view of life in confinement and their texts described the meanings they attributed to time perceptions while confined at home.

This study sought to explore the effects of the sudden life changes resulting from the COVID-19 lockdown, in addition to examining their implications and impacts on participants' daily lives, emotions and thoughts. Specifically, this study further investigated the thoughts and emotions related to time perceptions in a confined space, seeking to expand upon the existing knowledge regarding any related impacts on well-being or distress. The researchers collected data in Italy during the last week of March 2020, when the Italian government decreed a total lockdown as measure to contain the spread of COVID-19.

## MATERIALS AND METHODS

### Participants

The research participants were composed of psychology students from the University of Naples Federico II. Recruitment occurred during online lessons, via invitations from teachers inviting students to share their thoughts about the lockdown through the digital platform, SurveyMonkey. The study involved a total of 293 students, including 234 females and 59 males, between 19 and 29 years old, with an average of 20.85 years ( $SD = 3.22$ ). The strong gender disparity is representative of the general population of psychology students in Italy, in which women comprise 77.6% of students (Centro Studio Investimenti Sociali, 2019). **Table 1** displays participants' sociodemographic characteristics.

### Methods and Procedures

This study used a storytelling approach, collecting individual and relational experiences with the aim of creating shared

**TABLE 1** | Participant characteristics.

Age	<i>M</i> = 20.85	<i>SD</i> = 3.22
	%	<i>N</i>
<b>Sex</b>		
Male	20.1	59
Female	79.9	234
<b>Housing Situation</b>		
Living with one or both parents	90.8	266
Living alone	0.7	2
Living with a partner	1.0	3
Living with one or more roommates	3.1	9
Living with other family members	4.4	13
<b>Total</b>	100	293

awareness. Therefore, storytelling was much more than a device to deepen individual biographical paths, as it also served as a tool for shared support, common identification and social change. The researchers collected students' texts using the online platform SurveyMonkey as a teaching tool to support an online undergraduate community psychology course. The study asked participants to report their thoughts and emotions related to their lockdown experiences, as well as any other actions or events that they wished to share, limiting their written contributions to 10,000 characters or less. In the context of this study, it is pertinent to highlight the importance of using qualitative methods to detect shared meaning in individual stories using specific, defined procedures (Rappaport, 1995), which allow for meanings attributed to events to be detected, deepening the general knowledge regarding the subject and uncovering new perspectives and ideas (Salvatore et al., 2018).

## Data Analysis

We conducted the textual analysis using grounded theory methodology (GTM), which develops theoretical frameworks through the close examination of participants' narratives. It is a bottom up, qualitative approach, in which findings emerge from the data, in accordance with Glaser's (1992) principles. The use of GTM found receptive audiences among psychology and community-based researchers (Stewart, 2000; Rasmussen et al., 2016). The research team developed its coding activities using a bottom-up approach that was not based on *a priori* categories. This entails an "iterative process proceeding from substantive to theoretical coding. Grounded theorists proceed from the relationships between indicators in the data to the relation of these indicators to larger categories... The distinction between substantive and theoretical codes is the difference between the content observed in the data and what researchers theorize about that content" (Rasmussen et al., 2016, p. 25).

Grounded Theory is a methodology applied to qualitative research that involves the construction of hypotheses and theories through the collecting and analysis of data and for this reason it is used in all those researches in which there is no well-defined starting hypothesis.

Indeed, it was already used in other research that have deepened the psychological impact of the COVID-19 emergency (Di Napoli et al., 2021; Marzana et al., 2021; Migliorini et al., 2021).

The researchers began by open coding the texts and then grouping codes into larger categories in order to more fully understand the texts' proposed meanings. Namely, this study structured data analysis in 5 phases: (a) familiarization with the data, (b) initial code generation, (c) grouping the codes and their subsequent review, (d) defining and labeling the codes, and (e) creating code macro-categories and describing any relationships among them. Throughout all five steps, the research team interacted and discussed meanings using their reflective competences, agreeing up content definitions through these reciprocal and collective thought interactions.

For the data analysis Atlas 8 software (Muhr, 2017) was used.

## RESULTS

The analysis of the textual material resulted in 68 codes. The researchers subsequently organized these codes into 10 groups, which they later divided in three macro-categories (see **Table 2**). The results section elaborates on these macro-categories, code groups and some particularly explanatory quotations in greater detail.

### Confined in the Present

This macro-category is comprised of code groups that refer to participants' perceptions of the present time. It is indicative of how young people involved in the study dealt with the passage of time during the lockdown at home in a confined space. In fact, the study revealed four distinct code groups that were "*confined in the present*," and which reported different ways of relating to daily life during the COVID-19 state of emergency.

One identified code group encompassed participants whose time perceptions could be characterized as "*frozen time*," in the sense that they perceived the lockdown as impeding their routine professional, educational and leisure activities. Codes that characterized this category highlighted a condition of immobility, as well as one of estrangement and detachment from people and daily life routines and habits, as illustrated by the excerpt below (*normality on hold, a suspension of daily life activities, every day is the same*), as illustrated by one participant's thoughts "*We were forced to stop, to change our habits, to deal with a reality that no one had ever imagined possible.*"

These participants perceived time as frozen (*a sense of immobility*) and lacking direction in the present, as if they were lost in a desert without anything around, bereft of life, movement and relationships. Moreover, participants experiencing "*frozen time*" indicated that they lacked any interest in partaking in potentially different experiences, as they possessed little notion of time and also viewed outdoor spaces as empty and devoid of life (*deserted cities*), as illustrated by one participant's thoughts "*Life slowed down and then stopped. My village became silent in an instant. We were so rowdy, sentimental, 'physical,' passionate and friendly with everyone. This all stopped. Now, we no longer meet. We no longer touch each other.*"

A second identified code group regarding how participants experienced everyday life during the lockdown comprised those who were "*trapped in the present*." This code group refers to the difficulties that some young people experienced during the state of emergency, characterized by social isolation and forced confinement. In this context, many young adults who were "*trapped in the present*" perceived themselves as being locked up and unable to move. In fact, participants often reported a perception of being trapped, which they frequently characterized as unescapable or lacking a defined exit (*feeling caged in, the absence of an escape route*), as illustrated by one participant's thoughts "*But, at the same time, unfortunately, it has become a 'cage' that keeps me locked in these walls and does not allow me to breathe.*"

In addition, many participants who were "*trapped in the present*" emphasized a sense of unease due to their inability to leave their respective homes and/or countries (*quarantined*



**TABLE 2 |** Coding process.

Code	Codes group	Macro-categories
<i>A feeling of emptiness; a sense of immobility; a sense of strangeness due to absence of contact; a suspension of daily life; deserted cities; endless days; every day is the same; frozen time; normality on hold.</i>	<b>Frozen time</b>	<b>CONFINED IN THE PRESENT</b>
<i>Absence of an end; concern about not returning home; feeling caged in; impossibility of returning to one's home country; quarantined country; the absence of an escape route; travel interruptions.</i>	<b>Trapped in the present</b>	
<i>A surreal situation; chaos; feeling destabilized; feeling overwhelmed by the situation; loss of a life balance; sense of bewilderment.</i>	<b>Lost in time and space</b>	
<i>Birthday in quarantine; change of attitude toward others; importance of the present; new form of social relations; new interests; new situation; sudden lifestyle changes.</i>	<b>New life routines</b>	
<i>Inadequacy of past behaviors; past-present comparison; regret the past; reevaluation of social relationships; reevaluation of what you have.</i>	<b>Revalue the past</b>	<b>CONFINED IN THE PAST</b>
<i>A lack of freedom; a loss of privacy; a need for multiple spaces; a need to return to one's daily life; a sense of invasion; forced cohabitation; forced to stay at home; I can't wait to relive normalcy; importance of normality; imposed free time.</i>	<b>Return to normality</b>	
<i>Carpe diem; life is unpredictable; live life to the fullest; live now and not tomorrow; reevaluation of life; reevaluation of time; time is precious.</i>	<b>There is no time to waste</b>	<b>STRIVING TOWARD ONE'S GOALS</b>
<i>Distancing oneself from today and embracing tomorrow; future prospects; interest in future implications; tolerating uncertainty; uncertainty about the future.</i>	<b>Living in the present, but in anticipation of the future</b>	
<i>A unique experience; being alone with yourself; opportunity for change; opportunity to reflect; situation that marks you; stop and think.</i>	<b>Turning point</b>	
<i>Achieving a new life balance; evolution of oneself; greater awareness; personal growth; rediscover oneself; reevaluation of oneself.</i>	<b>Self-evolution</b>	

country, travel interruptions), or, conversely, to return to their home countries (impossibility of returning to one's home country), as illustrated by one participant's thoughts "The day the red zone was established in all of Italy, I was with my boyfriend in Holland. We were supposed to have stayed there for a week on vacation. As a result, we were constantly worrying about not being able to go home in the following days."

The third code group was comprised of participants whose perceptions could be described as "lost in time and space," alluding to the negative experiences generated by the expansion of the pandemic. Many participants reported having undergone moments where they felt lost and thought they would not be able to cope with the emotional burdens resulting from the pandemic (a surreal situation, a sense of bewilderment, feeling overwhelmed by the situation), as illustrated by one participant's thoughts "We are living in a moment that could be defined as a cyclone of emotions. We feel completely overwhelmed."

In fact, this dramatic, unprecedented situation has led many participants to experience confusion and to lose sight of their past reference points (chaos, feeling destabilized) "This situation shocked me because it forced me to reorganize my daily life. It pushed me away from the university life routines that I had previously created."

Finally, the fourth code group consisted of texts who viewed the lockdown as a chance to adopt "new life routines," highlighting a way of dealing with the present by emphasizing the positive aspects of confinement at home. These codes refer to participants who demonstrated proactive attitudes and an ability to dedicate themselves to exploring new interests in their free time, in addition to those who embraced this new lifestyle (new interests, sudden lifestyle changes) "Then, I rediscovered my interests, which

I had not cultivated for a long time. I started reading, writing, cooking, playing and drawing. And this is another thing that I will carry with me, and that I hope to continue doing, even when this situation is over."

In addition, participants whose time perceptions were shaped by their "new life routines" emphasized their ability to maintain and manage interpersonal relationships and active ties with family and friends, despite spatial distances, thanks to the use of social networks. Among this code group, the inability to see others in-person both enhanced and deepened their social ties in certain ways (new forms of social relations) "We try to stay close, thanks to video calls, even if we are physically far apart."

Finally, participants who embraced "new life routines" under lockdown underlined both their ability and desire to celebrate life events, albeit in alternative ways. They celebrated parties with relatives and friends all the same, through group calls on social networks (birthdays in quarantine) "We still celebrated my friends' birthdays, despite the fact that they occurred during the weeks under lockdown. It was strange, but still beautiful!"

## Confined in the Past

This macro-category contains all code groups that refer to participants who indicated tendencies to escape from the present by taking refuge in the past. Many young people reported a desire to return to the past, prior to the pandemic and the lockdown. This macro-category is comprised of two specific code groups, whose participants both evoked memories of their earlier lives and/or desired past actions that they did not take.

The first code group consisted of participants who sought to "revalue the past," referring to their desire to change certain aspects of their past, resume suspended activities or start

new activities that were made impractical by the lockdown. For example, many participants reported revaluing their past, with a particular focus on their interpersonal relationships (*reevaluation of social relationships*) and on aspects of their lives that they considered to be valuable, but not normally not appreciated and often taken for granted (*reevaluation of what you have*) “*In this dark moment, I learned how important is to appreciate what we have, without taking things for granted, how fundamental it is to love normality every day, to dedicate more time to the people we love and to stop every now and again and reflect. It allowed me to understand the irreplaceability of physical contact and embracing one another, as well as the need for reciprocity.*”

In some cases, participants also expressed awareness in conjunction with certain feelings of guilt related to their failures to put prevention and common sense behaviors into practice earlier in the pandemic, which could have minimized the spread of COVID-19 (*inadequacies of past behaviors*) “*The situation we are experiencing now is a reflection of the initial attitudes that everyone had toward this virus. We have been too irresponsible.*”

The second code group consisted of participants whose time perceptions focused on a “*return to normality*,” in reference to their desires to restore pre-pandemic norms as soon as possible and to resume their pre-pandemic daily lives, composed of actions, spaces and consolidated times. In fact, students often referred to the desire to regain their freedom, understood as the need to regain control of their daily time management. In particular, they strove to restore the division between moments dedicated to productive activities (work or study) and leisure time, which often lacked a clear partition during the lockdown (*a lack of freedom, a need to return to one's daily life; imposed free time*) “*It is not free time that is at my disposal now, since it is not time that I voluntarily chose to dedicate to myself. It is time that has imposed itself on me.*”

Participants' references to their living spaces comprise another important aspect of this code group. Some participants described their homes, which typically embodied feelings of safety and protection, as places of confinement similar to a prison, given the limits they imposed upon participants' freedoms. The lockdown also forced family members to share domestic spaces for much longer than in the pre-pandemic past, leading many young people to feel that their physical and mental spaces were being invaded (*a need for multiple spaces, forced cohabitation, a sense of invasion*) “*I have to adapt slowly, even if it is very difficult at 20 years old to live with 6 people in a 4-room house and to share a room with two younger sisters.*”

## Striving Toward One's Goals

The final macro-category includes four code groups that focus on a sort of “*time travel*” on the part of the study participants. This journey led participants to explore new time perceptions that they had never experienced before, in addition to well-known domestic spaces that were viewed in a different light. This journey also led participants to reassess their lives and enhanced their desire to live without wasting a moment, leading them to

evolve, to seek new experiences and to imagine a new future. The first code group can be characterized by a philosophy based upon the belief that, “*there is no time to waste.*” In fact, this idea encapsulates the reflections of many participants regarding life's value and the fact that unpredictable events, such as the COVID-19 pandemic, can occur and lead to limitations and suffering. The thought of the possibility that unpredictable events may occur led many participants to reconsider the importance of living life to the fullest, to avoid postponing important decisions and actions and to experience the present by appreciating small moments of happiness in life (*carpe diem, time is precious, life is unpredictable, live life to the fullest*) “*This experience is teaching me that life must always be enjoyed, every day*”; “*I have never realized the importance of time in my life. We young people lose sight of time's importance every day. We do not realize how much it really matters, and the fact that it would be beneficial to stop for a moment to reflect upon this.*”

The second code group consisted of participants who were “*living in the present, but in anticipation of the future.*” These participants' time perceptions were focused on the ways in which they lived through the lockdown, possessing an evasive attitude toward the present, which was viewed as a period that they must get through in order to have a brighter future. In fact, the responses of participants “*living in the present, but in anticipation of the future*” often referred to a time in the future when it will be possible to resume physical contact with others and when the pandemic will be just a bad memory (*tolerating uncertainty, distancing oneself from today and embracing tomorrow, future prospects*) “*We must endure this moment. It is difficult, but we know it will pass. It must pass! We have to think about the future, which will surely be better. Everything will be fine!*”

The third future-focused code group viewed the pandemic as a sort of “*turning point.*” Their reflections characterized this tragic event as an evolutionary crisis that marked a turning point in the lives of individuals and the community. These participants saw the obligation to stay at home as an opportunity to stop and think about their own lives and the directions that they had taken thus far, as well as the course of their future lives following their lockdown experiences (*stop and think, an opportunity to reflect*) “*This is a time that allows for introspection, allows you to talk to yourself and to listen to your ego. It is a time that allows us to discover, to rest, to recharge, to show our creativity and to escape the fast-paced society to which we have become accustomed. It is a time to understand that everything is fine and beautiful and that we have to listen to the silence, a silence that submerges us and which almost seems unnatural and stunning in its intensity.*”

The uniqueness of the lockdown experience has led participants to believe that their future attitudes and behaviors will change, in addition to accepting the idea that there will be talk of a before and after COVID-19, which they considered to be an epochal event (*opportunities for change, a unique experience, being alone with yourself*) “*It is clear that an experience of this type will be remembered for life. I am 20 years old today, and what I often think about is how I will tell my children and grandchildren about this experience in the future, just like my grandparents told me about the war, its dangers and the fear that prevailed at that time.*”

The fourth and final code group, entitled “*self-evolution*,” focused on the positive aspects of temporal immobility, viewing everyday life from new perspectives and with new meanings. The suspension of everyday life activities allowed participants to find time to compare themselves with others, facilitating a process of self-reflection among some interviewees (*rediscovering oneself, achieving a new life balance*): “*I seek to... make this period a moment to become stronger and a chance to rediscover myself, as it is occurring in a completely new and undoubtedly singular context and situation.*”

This dramatic experience has caused many participants to develop a greater awareness of themselves and their own lives and to experience personal growth (*greater awareness, personal growth*) “*In the future we will overcome this crisis and return to normal, but in a more conscious way, knowing that we have acquired that freedom through our sacrifices.*”

### Continuity of Being

Finally, the researchers created a core category labeled, “continuity of being” (see **Figure 1**).

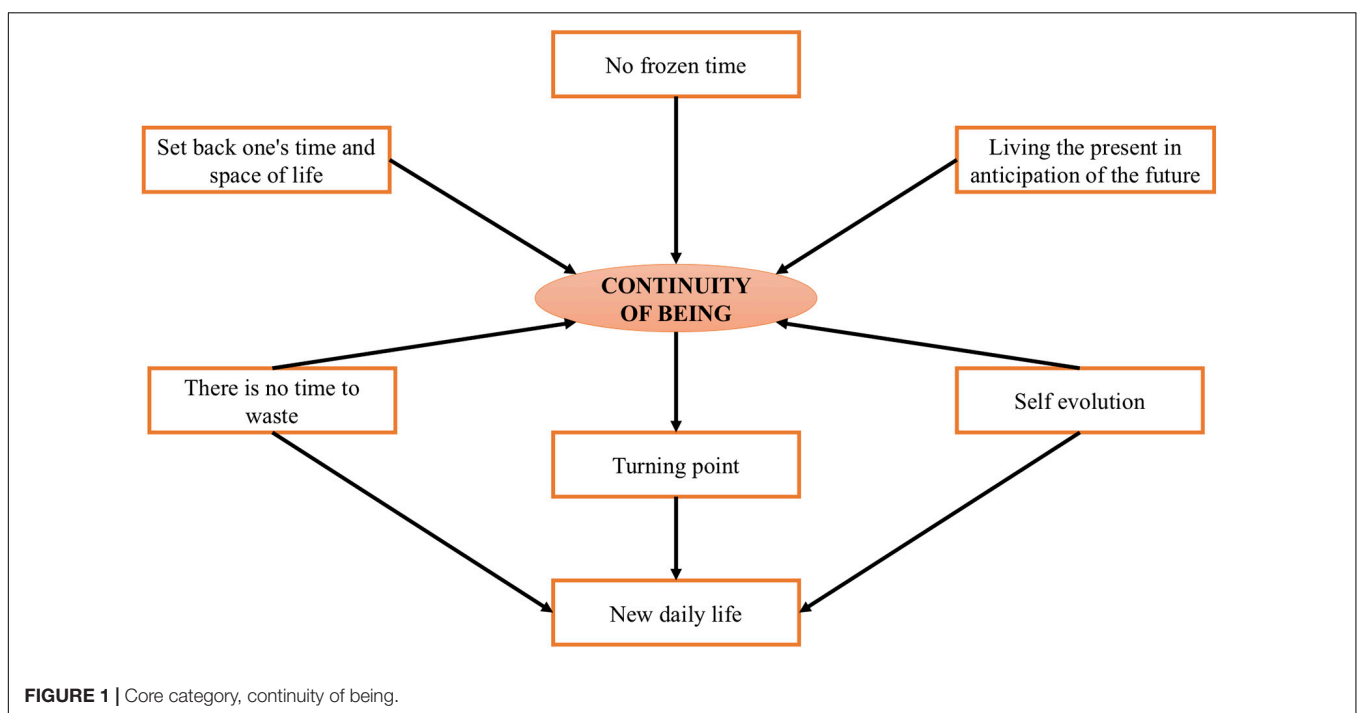
In light of the proactive and empowering approaches to the lockdown adopted by many participants, we named the core category, “*continuity of being*.” This core category was characterized by maintaining or creating connections with past experiences, the present and striving toward one’s goals. In this regard, we considered the importance of beneficial past and future time perceptions during the lockdown as resilience strategies to cope with pandemic-related distress. The interviewees consistently highlighted the importance of maintaining time continuity and defining time and space during the lockdown as methods of turning this period of downtime into an opportunity for personal growth.

## DISCUSSION

During the process of reading and interpreting the codes from this study and choosing participant quotations, the research team focused on the importance of the time-space divide that affected the interviewees’ emotions and thoughts. In fact, many interviewees reported changes in their daily time management in a confined space, in comparison with their usual activities. In the context of the COVID-19 pandemic, it would be interesting to understand any associations among people’s attitudes toward time and their levels of well-being, distress and anxiety. The experience of being spatially confined also confined many participants’ time perceptions to the present or in the past. However, for some participants, the lockdown has represented an unexpected opportunity to better understand themselves and to envision their futures.

Being confined in the present implied different meanings among the research participants. For multiple participants, being confined in the present has represented an opportunity to reorganize their time management and spaces, as well as to try new activities. However, for others, a present shaped by the lockdown represented a genuine obstacle that impeded their ability to envision new organizations of time and space, constructing their time perceptions of the present based upon their expectations to resume their pre-pandemic lives.

Conversely, other participants reported that home confinement entailed an excess of downtime that generated a state of stunned confusion, as well as perceptions of time characterized by feelings of suspension and immobility. Among these students, their lockdown experiences were framed by anguish, fear, uncertainty and sadness in relation to the recent events linked to the COVID-19 pandemic, in addition to an



unrelenting focus on the current situation and an inability to shift their focus to past events or hope for the future “*There are many conflicting thoughts and feelings that crowd our minds these days, during which we find ourselves experiencing an uneasy and worrying situation. Sadness was definitely the emotion that primarily characterized the first days of the lockdown.*”

Furthermore, among participants, a common sense of loss emerged. Home confinement became a distressing experience in a context of heightened anxiety surrounding death. This suspended, uncertain time confronted the study participants with their most primitive fears, such as their fear of death as pandemic dreaming also highlighted (Iorio et al., 2020), while limiting ties and changes to their family structures.

Conversely, several interviewees reported feelings of confinement in the past, shaped by positive nostalgic memories of their past everyday lives prior to the COVID-19 lockdown (Zimbardo and Boyd, 2015). Additionally, among some young adults, the changes in their daily routines under lockdown served as an opportunity to open or deepen a dialogue with themselves, connecting with their pasts and envisioning a new future. A break from the unrelenting perceptions of time imposed by society fostered acceptance of the situation, in addition to the development of proactive attitudes. Envisioning the future implied opportunities for greater self-awareness and for participants to deeply reflect upon their lives and lifestyles.

Moreover, the lockdown experience resulted in freedom from pre-pandemic routines, as well as the need to cope with this new reality. Being trapped in the present while looking toward the future induced many young interviewees to rediscover the potentiality of space and to create new plans for their own futures. Therefore, confinement at home and spatial distance could be viewed as a sort of transitional experience or a potential turning point.

It is important to mention that, although many young respondents experienced negative feelings regarding the lockdown, some of them were able to view the resulting spatial and time restrictions in a positive light, transforming their time under lockdown into something productive and finding ‘*serenity in disorder.*’ As a result, interviewees’ experiences in a confined space led them to develop different time perceptions of the past, present and future, characterized by time subjectivations that seem to exclude the possibility for dialog among the three temporal perspectives.

Moreover, the core category, “*continuity of being,*” described a proactive experience, especially for young people, to overcome what Rosa (2003) defines as a type of de-temporalization that pushes people to think moment by moment. In addition, the storytelling design of the study facilitated the development of awareness surrounding subjective oppression and vulnerability, as well as common experiences of suffering, giving voice to people’s shared feelings, in line with community psychology perspectives.

Individual narratives encompass the expression of individual and collective experience-making processes. Narration involves biographical, reconstruction, reinsertion, recreation, realignment and relocation perspectives. Additionally, for some authors, narration also serves as a semiotic device mediating the

connection between continuity and discontinuity, aimed not only at carrying out the previously mentioned functions, but also at creating new dynamic relations among them (Freda et al., 2015). Therefore, for participants, documenting their COVID-19 lockdown stories was an opportunity to reflect upon their lives that also acted as a resilience tool. In fact, opportunities mediated by creative expression, group discussions and shared actions aimed at individual and social awareness are a significant goal in community building, training and education (Carnevale et al., forthcoming; Arcidiacono et al., 2016; Di Napoli et al., 2019a). As a result, creating spaces in which people share their personal stories and ask questions about their common experiences is a preliminary goal of community psychology-based intervention strategies, while subsequently detecting meaning and symbolization in their interactions is the next step in promoting social awareness and community building (Arcidiacono, 2016; Procentese and Gatti, 2019; Procentese et al., 2019). Feeling part of a community where you share projects and consider the response of institutional members and referents reliable favors collective self-efficacy and the management of stress generated by this unforeseen emergency (Procentese et al., 2020).

## Limitations

Despite the contributions to the deepening of the existing literature, this study’s limitations included first of all its convenience sampling (non-probabilistic), so the generalization of results should be taken with caution. The unbalanced number of male and female respondents, although the sex composition of participants was representative of the general population of Italian psychology students (Arcidiacono and Tuozzi, 2017; Centro Studio Investimenti Sociali, 2019). Additionally, it is important to highlight the possibility that psychology students likely possess deeper reflective attitudes in comparison with students from other majors. Furthermore, the ethnic and geographical makeup of the sample was limited and was comprised solely of White university students living in a specific region of Italy. Therefore, any interpretation of the study results should be considered in conjunction with differing national and international contexts. Moreover, the researchers recommend that future studies also consider connections among young adults’ feelings regarding their physical and psychological well-being and their time perceptions. This study collected participants’ stories during the week with the highest number of reported COVID-19 cases in Italy; thus, it would be interesting to compare young peoples’ feelings and perceptions of their time under lockdown with their experiences during its de-escalation. The researchers further recommend that future studies explore any associations among time perceptions and well-being or negative emotions, in addition to comparing time perceptions across different phases of life.

## CONCLUSION

The space-time divide resulting from participants’ lockdown experiences was unexpected among the research team. Our



students' voices emphasized this aspect of the lockdown; thus, we sought to more profoundly explore this part of their experiences. Under lockdown, participants had to establish new time perceptions and new ways of "social sharing" to overcome physical confinement and distancing and to avoid further psychological distress in their daily lives.

According to Pichon-Rivière, in order to survive, hope must be planned through collective projects that help people face difficulties and changes. Planning hope emerges from people's abilities to create alternatives to collectively share spaces, such as singing from balconies in the context of the lockdown, as described by Di Napoli et al. (2021). The implications and impacts of the research findings could help in preparing plans and providing services in the context of a generalized pandemic. In this regard, the study findings help us recognize the impact of limits on one's actions and/or mobility on individuals' psyches. The young adult study participants described their lockdown experiences through varying perceptions of time, with some of them reliving their pasts, while others focused on rethinking and shaping their futures. The COVID-19 pandemic altered participants' lives in a spatial sense, relegating them to spend the days under lockdown reliving past connections, renewing contact with old friends and lovers and redefining their future expectations.

Moroccan anthropologist Zakaria Rhani (2019) documented experiences of severe confinement in Morocco during the Years of Lead (1956–1999). His interview with a political prisoner who spent most of his life confined in Tazmamart, a cold and secluded prison in the Atlas Mountains, best characterizes some of the effects of extreme confinement. In order to survive confinement in such a desolate space, the prisoner, Kawni, described how his body lived confined in prison, suffering from cold and hunger, while allowing his soul the opportunity to continue life far away from these deplorable conditions. Therefore, this body-soul divide allows individuals' spirits to survive in the face of repression and limits to individual freedoms. Reflecting upon this extreme situation aids in understanding how individual experiences of forced confinement may result in different time and space perceptions. In this regard, it is important to reflect upon how the effects of confinement on people's everyday lives results in the development of a wide array of individual resilience strategies.

The lockdown period has deprived people of their health, families and careers, but also of small everyday things, like grabbing a coffee in the morning or with friends, a kiss or a hug, affection, feelings, nature and the power of sharing. Furthermore, home confinement under lockdown implied an absence of close physical contact and the presence of other people in our lives. Therefore, maintaining continuity with past experiences and

future goals, without becoming trapped in the present, is a crucial need and a psychological resilience strategy to maintain life continuity. Tools and spaces for sharing during emergencies, became a goal. It will help to lower distress and favor a recovery path of continuity with the past and with new future perspectives. The continuity of time and space to meet and interact is a basic need that characterizes young people's life contributing to their well-being (Di Napoli et al., 2019b). Therefore, the core category of this research "continuity of being" emphasizes the role of time and moreover of shared time allowing the individual and relational experience of connectedness.

The soundness of these findings suggests the importance to take into account the perception of time, especially among young people that particularly suffer for their space limitation and lack of social interactions. Moreover, it would be interesting to devote some studies to the effect of lockdown space limitation on children with dyslexia already affected by time processing difficulties (Casini et al., 2017). In such cases tailor specific supportive interventions for their families may help in managing time/space limits of forced home confinement.

In the words of Ernest Pichon-Rivière (1985), from our youth we learned that in times of uncertainty and a "lack of hope," it is essential to undertake collective projects and to plan shared hope. Thinking on youth experiences in pandemic the public bodies have to be able to sustain with actions and projects their need of connectedness with their own experiences and the world around them.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

Studies involving human participants were reviewed and approved by the University of Naples Federico II Department of Humanities' Ethics Board for Research in Psychology (March 15, 2020). Participants provided written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

## AUTHOR CONTRIBUTIONS

All authors listed have made substantial, direct and intellectual contributions to this research, and approved it for publication.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Mental Symptoms and Stress of Hospitalized Schizophrenia Patients With 2019 Novel Coronavirus Disease: An Observation Study

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**Background:** The 2019 novel coronavirus disease (COVID-19) is an extremely rapidly spreading respiratory infection caused by SARS-CoV-2. Many schizophrenic patients were infected with COVID-19 in Wuhan City, Hubei Province. This study took hospitalized schizophrenia patients with COVID-19 as the research subjects and observed the changes in psychopathology and stress of patients with COVID-19 and the accompanying social isolation.

**Methods:** To sort and isolate potential COVID-19-infected patients, an isolated ward was set up from January 30, 2020, to March 30, 2020. Schizophrenia patients with COVID-19 were referred to this ward, and long-term hospitalized cases were included in this study. The Positive and Negative Syndrome Scale and Perceived Stress Scale were used to evaluate the severity of mental symptoms and psychological stress in the early stage of the outbreak of COVID-19, after the diagnosis of COVID-19 and after recovery. At the time of diagnosis, we also extracted the patient's routine blood, biochemical and other indicators and asked the patient's perception of COVID-19.

**Results:** 21 hospitalized schizophrenia patients with COVID-19 were recruited in this study. The changes in PANSS scores were not significant ( $p = 0.225$  baseline vs. diagnosed,  $p = 0.399$  cured vs. diagnosed). The CPSS scores increased significantly after diagnosis and transfer to the isolation ward ( $p < 0.001$  baseline vs. diagnosed,  $p < 0.001$  cured vs. diagnosed). The course of schizophrenia was a protective factor of stress levels to cases ( $t = -3.25$ ,  $p = 0.006$ ), and patients' perception of COVID-19 was a risk factor ( $t = 2.48$ ,  $p = 0.038$ ). The final multiple linear regression model was statistically significant ( $F = 8.16$ ,  $p < 0.001$ ).

**Conclusion:** Hospitalized schizophrenia patients with COVID-19 had increased stress levels and negative symptoms but alleviated positive symptoms after medical isolated treatment. This reminds us that in the face of major epidemics, we must specifically alleviate the psychological burden at the peak of the epidemic and improve the prognosis of patients after the epidemic.

**Keywords:** COVID-19, schizophrenia, psychopathology, stress, medical isolation



## INTRODUCTION

The 2019 novel coronavirus disease (COVID-19) is an acute respiratory infectious disease caused by the new coronavirus (SARS-CoV-2) (1). In Wuhan, Hubei province, the actual number of SARS-CoV-2 infection cases might be much higher than that has been reported (2). The rapid spread of the COVID-19 and its serious consequences pose severe challenges to public health in China and around the world (3, 4).

Since the outbreak of COVID-19, researchers have made numerous reports on the epidemiological characteristics, clinical characteristics, and prognosis of infection cases (5–8). As a stressful event with unknown treatment efficacy, prognosis, and mortality in the early stage of the epidemic, the population exposed to COVID-19 faced the severe challenge of psychological tolerance. According to a recent report by Wang et al. (9), in the early stage of the COVID-19 outbreak, more than half of the respondents in the general population were rated as moderate-to-severe in their psychological impact, and approximately one-third exhibited moderate-to-severe anxiety. Meanwhile, Hao et al. also confirmed that the strict lockdown measures accompanied by COVID-19 have a serious negative impact on psychiatric patients (10). A recent Italian study also reported that the COVID-19 pandemic has brought negative emotions to patients with bipolar disorder (11). For mental patients, stressful events are important factors that aggravate mental symptoms (12, 13).

Owing to the highly contagious nature of viruses, a considerable number of severe mental patients in Wuhan City, Hubei Province, have not been spared, including long-term hospitalized schizophrenic patients. However, due to the special management of mental diseases and requirements for epidemic prevention and control, few researchers have studied the effects of COVID-19 on the mental symptoms of severe psychotic patients. Hence, we examined schizophrenia patients with COVID-19 in a psychiatric specialty hospital located in Wuhan, Hubei Province, and conducted a study on the effect of COVID-19 and the accompanying social isolation on psychopathology and stress.

## METHODS

### Subjects

We collected long-term hospitalized psychiatric patients who were required to meet the diagnostic criteria of schizophrenia in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). They were between 20 and 65 years old, had stayed in the hospital for more than 2 years, and had hospital-acquired infections and were diagnosed with COVID-19. Polymerase chain reaction (PCR) testing for SARS-CoV-2 was positive, and chest CT scans showed patchy or frosted ground glass-like images, regardless of sex, unrestricted type, and measurement of antipsychotic drugs, and whether it was accompanied by common physical diseases such as hypertension, diabetes, and hyperlipidemia.

Patients with bipolar disorder, substance dependence, personality disorder, intellectual developmental disorder,

severe cognitive impairment, and mental disorders caused by physical diseases were excluded. In addition, critically ill patients with blood oxygen saturation below 93%, dyspnea, and patients with unstable vital signs were excluded. These patients were all transferred to designated hospitals for the treatment of severe diseases. Patients who were unable to cooperate with isolation treatment, such as severe violence and suicide, were also excluded, and these patients were transferred to special wards with a dedicated work team for intervention.

This study was reviewed and approved by the ethics committee of the medical institution where the patients were housed. All enrolled patients received written consent from the patient's family.

### Instruments

The electronic medical records were used to extract clinical characteristics, chest imaging characteristics, blood convention, biochemical indicators, and C-reactive protein (CRP) of the patients. The Positive and Negative Symptom Scale (PANSS) was used to assess the psychopathological changes of the included patients, and the Chinese Perceived Stress Scale (CPSS) was used to assess patients' perception of stress. According to PANSS's classification of mental symptoms, PANSS has three subscales: PANSS positive symptom subscale (PSS, items P1-7), PANSS negative symptom subscale (NSS, items N1-7), and PANSS General Psychopathology scale (GPS, items G1-16).

We added seven additional questions to assess the perception of COVID-19 in the included cases (called the COVID-19 perception questionnaire, CPQ), which were as follows:

1. Have you heard of the 2019 novel coronavirus disease?  
Options setting: yes and no
2. Do you know that the patients around you are also infected with this disease?  
Options setting: yes and no
3. Do you know why you transferred to this ward?  
Options setting: yes and no
4. Are you worried about the treatment effect after infection?  
Options setting: very worried, general, not worried
5. Are you worried about the dress of medical workers?  
Options setting: very worried, general, not worried
6. Are you worried about your family being infected?  
Options setting: very worried, general, not worried
7. Do you know the epidemic trend of the 2019 novel coronavirus disease?  
Options setting: yes and no

Scoring principle: We mark "yes" and "generally" equal to 1 point, "no" or "not worried" equal to 0 points, and "very worried" equal to two points. The higher the total score, the more comprehensive the patient's perception of COVID-19, and vice versa.

### Procedures

This study was designed as a clinical observation study. As early as January 2020, when the epidemic had not been reported on a

large scale, we completed the initial assessment of PANSS and CPSS for the long-term hospitalized schizophrenic patients. At that time (baseline), the patients were uninfected. As the epidemic continued to spread, isolation wards were set up in a certain psychiatric institution in Wuhan, Hubei Province, China on January 30, 2020, for the isolation and treatment of psychotic patients who were diagnosed with or suspected to have COVID-19. The isolation ward is set up ranging from 1 to 3 patients per room. After a week's work of ward reconstruction, the admission of patients began. From then on, the cured cases would be transferred out of the isolation ward, and at the same time, newly infected patients would be transferred into the isolation ward. We selected the confirmed cases of COVID-19, from transferred to the isolation ward to cured and transferred out for further follow-up observation. All medical services followed the Diagnosis and treatment of corona virus disease-19 issued by the National Health Commission of China. According to the guidelines, the drugs taken are antiviral, anti-inflammatory, and Chinese patent medicine. The second PANSS and CPSS were estimated within 3 days of diagnosis after the patient was transferred to the isolation ward. At this time, the routine blood, C-reactive protein, and biochemical indexes of the patient were extracted from the electronic medical record and CPQ were estimated. After the cases were cured, before they were transferred out of the isolation ward, the third PANSS and CPSS evaluation were performed. The raters in this study were all psychiatrists with professional training and experience in managing psychopathological tests.

We used a table to show the detailed characteristics of the general clinical data and longitudinally compared the differences in the total score of PANSS, the scores of the three subscales of PANSS and CPSS at different time points. We also analyzed the factors affecting the stress levels of the included patients.

## Data Analysis

According to the characteristics of the final data, if the continuous measurement data obtained were normally distributed, they were expressed as the mean and standard deviation (SD). The categorical variables were expressed as counts and percentages. Paired *t*-test was performed on continuous variables with normal distribution, and multiple linear regression was used to analyze stress factors. The significance level of all statistical tests was set as  $p < 0.05$  (two tails). Data analysis was performed using IBM SPSS version 26.0 statistical software (SPSS Inc., Chicago, IL, USA), and figures were plotted using GraphPad Prism version 8.4 software (GraphPad Software Inc., La Jolla, CA, USA).

## RESULTS

### General Clinical Treatment Characteristics

A total of 57 patients entered the ward for screening because of suspected or confirmed COVID-19, and 21 schizophrenic patients with COVID-19 were cured and discharged. Following the requirements of epidemic control,

**TABLE 1 |** Clinical characteristics of schizophrenia patients with COVID-19.

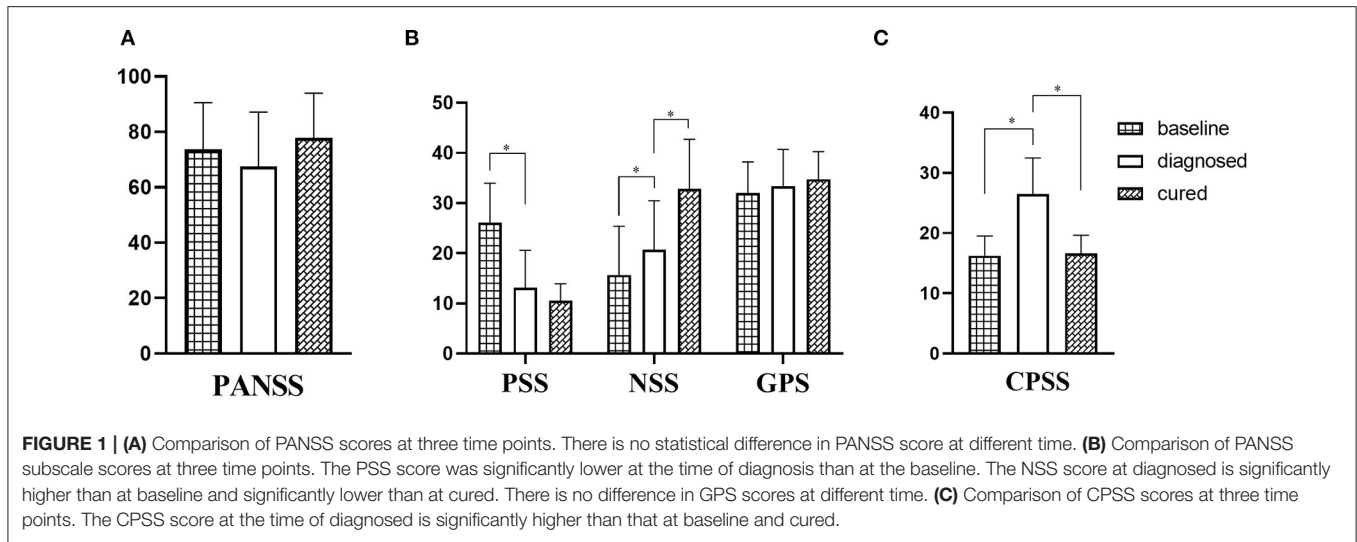
Index	COVID-19 patients ( <i>n</i> = 21)
<b>Age - years</b>	
Mean (SD)	43.1 (2.6)
Range	24–61
<b>Sex</b>	
Female	12 (57.1%)
Male	9 (42.9%)
Length of stay – years (SD)	4.2 (3.4)
Course of schizophrenia-years (SD)	6.8 (5.6)
Duration of healing – days (SD)	31 (10.2)
Take an antipsychotic drug- <i>n</i> (%)	5 (23.8%)
Take two antipsychotic drugs- <i>n</i> (%)	16 (76.2%)
Protective constraint – <i>n</i>	0
<b>Infection symptoms</b>	
Asymptomatic throughout	4 (23.8%)
Respiratory symptoms	8 (38.1%)
Digestive symptoms (diarrhea)	1 (4.8%)
Only one symptom of fever	8 (38.1%)
<b>First chest CT findings - <i>n</i> (%)</b>	
Unilateral	10 (47.6%)
Bilateral	11 (52.4%)
<b>Worsening infection following chest CT reexamination</b>	
Yes	16 (76.2%)
No	5 (23.8%)
<b>Routine blood test - <i>n</i> (%)</b>	
Leukopenia	4 (19.0%)
Lymphocytopenia	6 (28.6%)
Both	11 (52.4%)
Elevated CRP	4 (19.0%)
Normal CRP	17 (81.0%)
Additional intravenous antibiotic therapy	4 (19.0%)
<b>Adjustment of antipsychotic drugs during isolation</b>	
Increase in the doses	1 (0.5%)
Increased benzodiazepines	2 (1%)
Decrease in the doses	2 (1%)

the transfer of the last cured patient to the designated site for continued observation was completed at 6 p.m. on 30 March 2020.

The general clinical characteristics of the 21 patients who completed this study are shown in **Table 1**.

### The Difference of the PANSS and Its Subscales and CPSS

There were no significant differences in PANSS scores of the included patients at the three time points of the early stage of the epidemic (baseline), within 3 days after diagnosis with COVID-19 and transported to the isolation ward (diagnosed) and cured (cured) ( $p = 0.225$  baseline vs. diagnosed,  $p = 0.399$  cured vs. diagnosed) (**Figure 1A**). In addition, the positive symptom subscale scores of “diagnosed” were significantly lower than those of “baseline” ( $p < 0.001$ ) (**Figure 1B**). The



**TABLE 2 |** Multiple linear regression analysis of influencing factors of patients’ psychological stress.

Variable	Coefficient	Standard deviation	Standardized coefficients	95% CI	t	p
Constant	41.18	7.47		(25.16, 57.20)	5.51	0.000
Sex (female vs. male)	-4.77	2.73	-0.40	(-10.62, 1.08)	-1.75	0.102
Age	0.06	0.13	0.11	(-0.23, 0.35)	0.42	0.684
Course of schizophrenia	-0.49	0.15	-0.81	(-0.82, 0.17)	-3.25	0.006*
Duration of hospitalization	-0.14	0.48	-0.06	(-1.17, 0.89)	-0.29	0.774
Years of education	-0.40	0.33	-0.21	(-1.11, 0.32)	-1.19	0.254
Symptoms associated with infection (without vs. with)	5.77	3.05	0.39	(-0.77, 12.31)	1.89	0.079
CPQ	2.08	0.84	0.66	(2.65, 3.91)	2.48	0.038*

\*p < 0.05 (CPQ, COVID-19 perception questionnaire, Mean ± standard deviation: 6.19 ± 1.91; 95% CI, 95% Confidence Interval).

negative symptom subscale scores were significantly higher when “diagnosed” compared to “baseline” ( $p < 0.001$ ) and “cured” compared to “diagnosed” ( $p < 0.001$ ). The CPSS scores of “diagnosed” patients were significantly higher than those of “baseline” ( $p < 0.001$ ) and “cured” ( $p < 0.001$ ) (Figure 1C).

### Multiple Linear Regression Analysis of Influencing Factors of Patients’ Psychological Stress

Multiple linear regression analysis was used to analyze the psychological pressure of patients (CPSS) when diagnosed as a dependent variable, and gender, age, course of schizophrenia, duration of hospitalization, years of education, symptoms associated with infection and COVID-19 perception questionnaire (CPQ) were independent variables, as shown in Table 2. The course of schizophrenia was a protective factor of stress levels to cases ( $p = 0.006$ ), and patients’ perception of COVID-19 was a risk factor ( $p = 0.038$ ). The final multiple linear regression model was statistically significant ( $F = 8.16, p < 0.001$ ).

### DISCUSSION

To the best of our knowledge, this is the first clinical study on schizophrenia patients with COVID-19, investigating the changes in psychological pressure and psychiatric symptoms in cases with COVID-19 infection and isolation therapy. We found that patients with COVID-19 did experience increased stress levels and negative symptoms but alleviated positive symptoms. The course of schizophrenia was a protective factor of stress levels in cases; in contrast, patients’ perception of COVID-19 was a risk factor.

As a global pandemic impacting public safety, the general population is susceptible to COVID-19. The rapid spread of the virus and the uncertainty of the virus significantly increased the psychological burden of the general population (9). People with stable clinical symptoms after COVID-19 infection also showed obvious symptoms of posttraumatic stress (14). Another study recently studied people who developed psychiatric symptoms and found that psychotic episodes were significantly associated with coronavirus exposure (15). The latest research suggests that more than one-third of psychiatric patients might fulfill the diagnostic criteria post-traumatic stress disorder (PTSD) during

the peak of COVID-19 epidemic with strict lockdown measures (10). Another study from the United Kingdom showed that those who have or had COVID-19-related symptoms are more likely to develop general psychiatric disorders (16). In addition, the general population without a history of psychiatry also showed psychotic symptoms with structured delusions mixed with confusion as a common feature after being infected with COVID-19 (17). However, none of these studies could specifically target schizophrenia patients with COVID-19. SARS-CoV-2, a novel coronavirus with similar neurotrophic effects (18), was only reported for the first time after the outbreak. To date, we have not had enough time to track the future incidence of mental disease of nonpsychotic patients who were exposed to COVID-19 and the long-term impact of psychiatric symptoms on schizophrenic patients exposed to COVID-19. As far as this study, there were no significant changes in psychiatric symptoms in schizophrenia patients with COVID-19 during short-term follow-up observations. However, this is not the end, as COVID-19 may have a long-term impact on the mentally ill, and we will perform in-depth follow-up observations.

Regardless of the effect of nervous system infection on mental illness, stressful events have always been considered one of the important factors for the occurrence and deterioration of mental illness (12, 13). An interaction between external stressors and intrinsic vulnerability was one of the longest standing pathoetiological explanations for schizophrenia, also known as Diathesis-Stress Hypothesis (19). The hypothesis suggest that psychosocial stress may promote pathological microglia activation, which may lead to excessive synapse pruning and loss of cortical gray matter. Based on this, if the stress-sensitive area is damaged, this may lead directly to cognitive and negative symptoms; and loss of cortical control may also lead to disinhibition of subcortical dopamine—thereby leading to positive psychotic symptoms.

In this study, we confirmed that COVID-19 and transfer to isolation wards significantly increased the perception of psychological pressure. However, the increase in psychological pressure may not only be limited to COVID-19 itself, which also includes the strict isolation measures that have led to more narrow living spaces and the impact of environmental changes such as the different dress of the medical staff during wards rounds. Analysis of the factors that affect patients' psychological stress found that the course of schizophrenia constitutes an independent influencing factor for the reduction in psychological stress, that is, the longer the course of illness, the less psychological stress the patient would feel. A 6-year follow-up study found that the cognitive function of long-term hospitalized schizophrenia patients will gradually deteriorate over time (20). Based on this, we infer that the cognitive capacity of the enrolled patients decreased significantly due to the longer course of schizophrenia, thereby reducing the patients' awareness of the threat and danger of COVID-19, and thus reducing the psychological stress they presented. It should be emphasized that this psychological stress only manifested in the early stage of diagnosis of COVID-19, and the adaptation to the environment after a longer period of isolation may alleviate the patient's perception of stress.

Our study found that the severity of psychiatric symptoms of patients during isolation did not change significantly, which corresponds with the fact that the dosage of antipsychotic drugs is rarely adjusted during isolation therapy. This is different from the results of previous studies (21–23), which supposed stress and the severity of psychiatric symptoms were significantly related. However, without exception, all the previous studies took daily stress events as research elements. These stress events are more moderate in intensity, longer in time, and less threatening. This is the biggest difference between daily stress events and the stress events of this epidemic and may be the main reason for the difference in research results. This is the biggest difference between daily stress events and stressful events in the context of this epidemic. This may also be the main reason for the difference in research results. Additionally, positive symptoms were reduced, while negative symptoms were increased during the study. An animal study showed that socially isolated mice exhibited schizophrenia-like behaviors, such as a negative symptom phenotype (24). We speculated that the deterioration of negative symptoms in patients was the result of long severe social isolation and lack of adequate interpersonal communication caused by the COVID-19.

This article also has certain deficiencies. Due to the need for epidemic prevention and control, the patients in the group were transferred to the designated place for further isolation and observation after reaching the discharge standard. Therefore, our observation of the patients is short-lived, and the long-term impact of COVID-19 infection on schizophrenic patients needs further follow-up observation. To prevent cross-infection, it is difficult to carry out a larger sample study at present. A smaller sample size also harms the statistical efficiency of the study.

In conclusion, hospitalized schizophrenia patients with COVID-19 had increased stress levels and negative symptoms but alleviated positive symptoms after medical isolated treatment. This suggests that effective measures should be taken to relieve the psychological pressure of exposing patients with schizophrenia during the outbreak of a major epidemic, and targeted relief of negative symptoms of the patients is needed after the epidemic.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by The Ethics Committee of Wuhan Mental Health Center is affiliated to Wuhan Mental Health Center. The patients/participants provided their written informed consent to participate in this study.



## AUTHOR CONTRIBUTIONS

LL and XL made substantial contributions to conception and design of the study. LZ and RL collected and collated the data. JM analyzed and interpreted data and drafted and revised the manuscript. JM and TJ were responsible for the evaluation of the scale. HH collected imaging data. XL gave final approval of the version to be published. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Strange Days: Adult Physical Activity and Mental Health in the First Two Months of the COVID-19 Pandemic

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**Background:** In addition to its physical health benefits, physical activity is increasingly recognized as a means to support mental health. Regular moderate-to-vigorous physical activity (MVPA) is associated with improved mental well-being, reduced likelihood of developing mental illness, and improved symptom management. Despite these benefits, most people fail to achieve minimum recommended levels of MVPA. Population levels of physical activity have further declined since the onset of the COVID-19 pandemic and implementation of public health measures (e.g., shelter-in-place protocols). The potential impact of this decline on mental health outcomes warrants ongoing investigation.

**Purpose:** To investigate associations between changes in MVPA and mental health (depressive symptoms, anxiety symptoms, and life satisfaction) in adults impacted by the COVID-19 pandemic.

**Method:** Research followed a cross-sectional design. English-speaking adults were invited to complete an online questionnaire. MVPA was assessed retrospectively (before COVID-19) and currently (during COVID-19) with the International Physical Activity Questionnaire. Mental health was assessed with the Patient Health Questionnaire, 9-Item (PHQ-9), the Generalized Anxiety Disorder, 7-Item (GAD-7), and the Satisfaction with Life Scale (SWLS). Regression was used to assess relationships between MVPA and mental health. ANOVA with follow-up tests examined whether participants who differed in mental health status (e.g., no symptoms vs. severe symptoms) differed in their change in MVPA. *T*-tests were used to examine differences in mental health symptomatology between participants who were sufficiently (i.e., achieving MVPA guidelines of  $\geq 150$  min/week) vs. insufficiently active.

**Results:** Prior to COVID-19, 68.2% of participants were classified as being sufficiently active, vs. 60.6% during COVID-19. The majority of participants reported experiencing some level of depressive symptoms (62.0%) or anxiety symptoms (53.7%). After controlling for covariates, changes in MVPA accounted for significant variability in the PHQ-9 (7.7%), GAD-7 (2.5%), and SWLS (1.5%). Participants with clinically significant mental health symptomatology reported greater declines in MVPA than those who reported no symptoms. Conversely, participants who were sufficiently active during COVID-19 reported significantly lower depression and anxiety, and higher life satisfaction.

**Conclusion:** Participants who experienced the greatest declines in MVPA reported relatively greater psychological distress and lower life satisfaction. While preliminary, these findings suggest the importance of maintaining and promoting physical activity during a period of pandemic.

**Keywords:** depression, anxiety, life satisfaction, public health, moderate-to-vigorous physical activity

## INTRODUCTION

Regular participation in physical activity has long been recognized for its physical health benefits. For instance, moderate-to-vigorous physical activity (MVPA; e.g., brisk walking, lap swimming) is known to both prevent and manage chronic conditions like cardiovascular disease, type-2 diabetes, and cancer (1); whereas balance/flexibility activities (e.g., yoga, tai chi) are associated with improved mobility and functional abilities (2–4). Similarly, physical activity is increasingly embraced as a means through which to support mental health. Not only does physical activity promote well-being (5), but it is associated with reduced risk of developing mental illness (6) and improved symptom management in those with a pre-existing condition (7). The benefits of physical activity have been observed across diverse psychiatric and neurological conditions, such as anxiety (8), post-traumatic stress disorder (9), attention-deficit hyperactivity disorder (10), and dementia (11, 12). Recently, exercise has been recommended as a first-line treatment for mild-to-moderate depression and as an adjunctive treatment of moderate-to-severe depression (13).

Various national (14, 15) and international (16) physical activity guidelines recommend that adults engage in at least 150 min of MVPA per week to achieve health benefits. Muscle strengthening and balance/flexibility activities are also recommended. Surveillance studies consistently illustrate that populations fail to achieve this minimum level of activity. In the United States, ~23% of adults meet both aerobic and muscle-strengthening physical activity guidelines (17). Similarly, in a device-based study of Canadians, only 15% of participants achieved national physical activity guidelines, whereas only 5% achieved them on a regular basis (18). Such low levels of PA have notable implications for the health and wellness of nations.

### Physical Activity in the Time of COVID-19

The novel coronavirus disease, COVID-19 (“COVID”), was first identified in the Wuhan region of China in December 2019 (19, 20). It was subsequently declared a global pandemic on March 13, 2020. In an effort to control the spread of the virus, many nations have implemented widespread and significant public health measures such as closing non-essential businesses, closing international borders, banning large gatherings of people, mandatory self-isolation, and requiring individuals to maintain a minimum physical distance with others.

An inadvertent consequence of COVID public health protocols has been a decline in physical activity. A systematic review of 66 studies examining physical activity and sedentary behavior during COVID demonstrated consistent declines

in physical activity during the initial COVID-19 lockdown regardless of subpopulation or methodology used (21). Such observations are not unexpected given widespread closure of recreation facilities and public parks, a shift to working from home, and shelter-in-place protocols. In Canada, declines of ~13, 15, and 13% were observed in device recorded MVPA, light physical activity, and step counts, respectively (22). Though public health measures are necessary for reducing disease transmission, there is concern that the resulting reductions in physical activity may have implications for physical and mental health (23, 24). In response, individuals have been encouraged to remain active during the COVID pandemic (25–27), such as through outdoor exercise or home-/apartment-friendly activities (28, 29).

### Physical Activity, Mental Health, and COVID

The existent evidence for the mental health benefits of physical activity stems from studies that have been conducted under “regular conditions.” The unique characteristics of the COVID pandemic – including the rapid speed at which changes are occurring and the disruption in regular daily routines – are unprecedented in their scope and impact. Literature from early in the COVID pandemic indicates that symptoms of anxiety and depression (16–28%) and stress (8%) are common psychological reactions to COVID (30). The extent to which physical activity may buffer against the psychosocial impact of COVID remains less studied. In Canada, individuals who were inactive during the COVID pandemic reported lower mental well-being and higher anxiety compared to active individuals (31) and women reported significantly higher generalized anxiety than men (32). The purpose of the current study was to extend this work and examine associations between MVPA and other mental health outcomes in the early phases of the COVID pandemic. It was hypothesized that a negative relationship would be observed between changes in MVPA and psychological distress (anxiety and depressive symptomatology); and that a positive relationship would be observed between changes in MVPA and life satisfaction.

## MATERIALS AND METHODS

### Participants and Design

The current study followed a cross-sectional, observational design. All study protocols received approval from The University of British Columbia Research Ethics Board (#H20-00899). Individuals were eligible to participate if they were age 18 years or older and able to communicate in English. Given the classification of COVID as a pandemic at the time of study

launch, no restrictions were placed on individuals' country of residence. With an alpha level of 0.05, power of 80%, and anticipating a small effect size (33), a total of 395 participants were required for regression analyses and 302 participants for ANOVA (34).

## Measures

### Sociodemographic Variables

Basic sociodemographic information, such as educational attainment and employment status, were collected for descriptive purposes. Additionally, age, gender, and body mass index (BMI; from self-reported height and weight) were collected to serve as covariates in regression analyses (35–38).

### Physical Activity

Self-reported MVPA was assessed with a modified International Physical Activity Questionnaire, Short Form (IPAQ) (39). The IPAQ is a validated measure of physical activity that is commonly used in epidemiological studies. The questionnaire invites participants to report the number of days per week and the amount of time per day (in hours and minutes) spent in vigorous physical activity, moderate physical activity, and light physical activity. Weekly minutes of vigorous- and moderate- intensity physical activity were calculated by multiplying by daily minutes by number of days. Subsequently, weekly minutes of MVPA were calculated by adding minutes of moderate-intensity and vigorous-intensity activity, with maximum scores truncated to 1260 min as guided by IPAQ scoring protocols (<https://sites.google.com/site/theipaq/scoring-protocol>). In the current study, participants reported physical activity twice: before COVID ("pre-COVID") and over the past 7 days ("during-COVID"). For the pre-COVID measure, participants were asked to report their level of activity on a typical week *before* COVID-related restrictions were implemented. Participants were reminded that COVID was declared a pandemic on March 13, 2020; and that their reference period would likely be late February or early March.

### Depressive Symptomatology

Depressive symptomatology over the last 2 weeks was assessed with the Patient Health Questionnaire, 9-Item (PHQ-9) (40). The PHQ-9 has nine items, which correspond with the criteria for major depressive disorder as outlined in the Diagnostic and Statistical Manual of Mental Disorders (DSM) (41). Responses are made on a 0 to 3 scale (maximum score of 27), with greater values indicating greater symptom severity. Scores of 5, 10, 15, and 20 are indicative of mild, moderate, moderate-severe, and severe major depressive symptoms, respectively. Using a threshold of  $\geq 10$ , the scale has 0.88 sensitivity and 0.88 specificity for major depressive disorder (40).

### Anxiety Symptomatology

The occurrence of general anxiety symptoms over the last 2 weeks was assessed with the Generalized Anxiety Disorder, 7-Item (GAD-7) (42). The GAD-7 has 7 items which correspond with the symptom criteria for generalized anxiety disorder as outlined in the DSM (41). Like the PHQ-9, responses are made on a 0 to

3 scale (maximum score of 21), with greater values indicating greater symptom severity. Scores of 5, 10, and 15 are indicative of mild, moderate, and severe anxiety symptoms, respectively. Using a threshold of  $\geq 10$ , the scale has 0.89 sensitivity and 0.82 specificity for generalized anxiety disorder (42).

### Life Satisfaction

Participants' overall sense of well-being was assessed with the Satisfaction with Life Scale (SWLS) (43). The SWLS was developed as a measure of the cognitive component of subjective well-being: that is, an individual's judgement regarding whether their life is good or poor. Participants are presented with 5 items, such as "The conditions of my life are excellent." Items are rated on a five-point Likert scale, ranging from 1 (Strong Disagree) to 5 (Strongly Agree), with higher scores indicative of greater perceived quality of life. Though the scale is recommended for use as a continuous variable, it is also possible to score categorically (44) with classifications ranging from extremely satisfied (scores of 31–35) to extremely dissatisfied (scores of 5–9).

### Procedure

Participants were recruited online through social media advertisements (Twitter, Facebook, Instagram, LinkedIn) and alumni newsletters. Recruitment occurred between March 24 and May 8, 2020. Interested volunteers were directed via hyperlink to an online survey. After completing eligibility items and providing informed electronic consent, participants were presented with three clusters of questionnaire items: sociodemographic variables, the IPAQ, and the three mental health scales. At the end of the questionnaire, participants were debriefed, thanked for their participation, and were provided the opportunity to enter their name into a draw.

### Data Analysis

Data screening and management procedures were conducted in accordance with the recommendations of Tabachnick and Fidell (45). All analysis was conducted using SPSS Statistics, v.25 (IBM, US). Two groups of analyses were conducted. The first utilized hierarchical regression to examine associations between MVPA and mental health. Age, gender, and BMI were entered as covariates (35–38). Change in self-reported MVPA, calculated as the difference between during-COVID MVPA and pre-COVID MVPA, served as the predictor variable. Thus, negative values indicate a decrease in MVPA whereas positive values indicate an increase in MVPA. The outcome variables were PHQ-9, GAD-7, and SWLS continuous scores.

The second group of analyses examined between-group differences. With regards to mental health, participants were categorized according to standard interpretive thresholds for the PHQ-9 (40), GAD-7 (42), and SWLS (44). ANOVA was used to examine between-group differences in change in MVPA. With regards to MVPA, participants were classified as being sufficiently active if they self-reported  $\geq 150$  min MVPA per week, and insufficiently active if they reported  $< 150$  min MVPA (14–16). ANOVA was used to examine between-group differences in mental health outcomes (PHQ-9, GAD-7, SWLS) between these



groups. Analyses were conducted twice, to examine pre-COVID and during-COVID MVPA status. Bonferroni correction was applied to control for Type I error. In all analyses, equal variance was not assumed.

## RESULTS

### Participants

The online survey was accessed 1,005 times, of which 9 individuals were ineligible due to being age 17 or younger; 9 individuals were ineligible due to not being able to communicate in English; and five individuals declined consent to participate. A further 340 did not proceed beyond the eligibility screening questionnaire, primarily due to “bot” traffic. A total of 665 individuals accessed the intake survey, of which 248 provided incomplete data. There were no differences in survey completion based on age, gender, or BMI ( $t = 0.367$ ,  $p = 0.713$ ;  $t = 0.344$ ,  $p = 0.731$ ; and  $t = 1.814$ ,  $p = 0.07$ , respectively).

The final sample had an average age of 32.2 ( $SD = 13.6$ ) years. Most participants self-identified as being a woman (86.8%) and well-educated (62.7% with an undergraduate degree or greater), and were employed either full- or part-time (42.3%). The majority were classified in the normal range of BMI (62.7%). One-third (32.3%) of the sample identified they were of North American descent, such as Quebecois or American. Full sample details can be found in **Table 1**.

### Physical Activity

Participants self-reported a mean of 406 ( $SD = 380$ ) minutes of MVPA per week prior to COVID, compared to 361 ( $SD = 388$ ) minutes of MVPA per week after COVID. The mean reported change in MVPA was  $-45$  ( $SD = 389$ ) minutes. Approximately half of the sample (45.4%) reported a decrease in MVPA, while a quarter (22.7%) reported no change in MVPA, and the remainder (31.8%) reported an increase in MVPA.

Prior to COVID, 68.2% of participants self-reported being sufficiently active for health benefits (i.e.,  $>150$  min 193 MVPA per week). This decreased to 60.6% of participants during the initial period of the COVID pandemic.

### Mental Health

Participants reported a mean PHQ-9 score of 7.4 ( $SD = 6.0$ ), indicative of mild depressive symptomatology. While a large minority (38.0%) reported experiencing no significant depressive symptoms, 33.9% reported mild symptoms, 14.4% moderate, 8.4% moderate-severe, and 5.3% severe. Similarly, participants reported a mean GAD-7 score of 6.5 ( $SD = 5.6$ ). A large minority (46.3%) reported experiencing no significant anxiety symptoms, whereas 27.2% reported mild symptoms, 14.9% moderate, and 11.6% severe. With regards to well-being, participants reported a mean SWLS score of 24.1 ( $SD = 6.8$ ). The majority (76.4%) of participants reported scores at or above the scale midpoint.

### Regression Models

All regression models controlled for age, gender, and BMI. Three separate models were examined: the relationship between (1)

**TABLE 1 |** Demographic and descriptive characteristics of participants.

	<b>N (%)</b>	<b>Mean (sd)</b>
Age		32.2 (13.6)
BMI category		
Underweight	1 (2.4)	
Normal weight	322 (62.7)	
Overweight	116 (22.6)	
Obese	74 (14.4)	
Country		
Australia	1 (0.2)	
Canada	398 (79.8)	
Hong Kong	1 (0.2)	
Ireland	1 (0.2)	
Philippines	17 (3.4)	
UK/N.IRL	16 (3.2)	
USA	65 (13.1)	
Gender		
Woman	452 (86.8)	
Man	66 (12.6)	
Non-binary	2 (0.8)	
Prefer not to answer	2 (0.4)	
Ethnicity		
Indigenous	16 (3.0)	
African	1 (0.2)	
Central Asian	3 (0.6)	
East Asian	129 (24.1)	
Hispanic	21 (3.9)	
Mediterranean	2 (0.4)	
Middle Eastern	24 (4.5)	
Pacific Islander	15 (2.8)	
South American	1 (0.2)	
South Asian	19 (3.6)	
Northern European	59 (11.0)	
Eastern European	6 (1.1)	
Northern American	173 (32.3)	
Western European	61 (11.4)	
Other	1 (0.2)	
Prefer not to answer	1 (0.2)	
Highest level of education		
Less than high school	1 (0.2)	
High School	98 (18.8)	
Diploma or certificate	61 (11.7)	
Undergraduate	196 (37.6)	
Graduate	137 (26.3)	
Professional degree	27 (5.2)	
Prefer not to answer	1 (0.2)	
Employment Status		
Student	168 (25.8)	
Full time	199 (30.5)	
Part time	77 (11.8)	
Self-employed part-time	24 (3.7)	

(Continued)

**TABLE 1** | Continued

	N (%)	Mean (sd)
Retired	8 (1.2)	
Homemaker	37 (5.7)	
On disability	37 (5.7)	
Unemployed looking for work	5 (0.8)	
Unemployed not looking for work	2 (0.4)	
Unemployed laid off	71 (10.9)	
Other	22 (3.4)	
Prefer not to answer	1 (0.2)	
Living location		
City/urban	354 (68.1)	
Suburbs	73 (14.0)	
A town or village	39 (7.5)	
Country/rural	54 (10.4)	
Type of housing		
Detached	272 (52.1)	
Semi-detached	63 (12.1)	
Apartment/condo	92 (17.6)	
Shared housing	76 (14.6)	
A dormitory	18 (3.5)	
Prefer not to answer	1 (0.2)	

BMI, body mass index; SD, standard deviation.

MVPA and PHQ-9, (2) MVPA and GAD-7, and (3) MVPA and SWLS.

Overall, the models provide evidence for associations between MVPA and mental health during COVID. For depression and anxiety, a self-reported decrease in MVPA was associated with higher scores on the PHQ-9 and GAD-7 (Pearson correlation =  $-0.284$ ,  $p < 0.001$ ; and  $-0.161$ ,  $p = 0.001$  respectively). Increases in MVPA were associated with higher levels of life satisfaction (Pearson correlation =  $0.126$ ,  $p = 0.007$ ). Please see **Table 2** for correlation tables for all variables included in models.

For mental health, significant variability was explained by change in MVPA from pre-COVID to during-COVID. After controlling for age, gender, and BMI, changes in MVPA accounted for 7.7 % variability in PHQ-9 scores ( $F = 26.182$ ,  $R = 0.470$ , *adjusted*  $R^2 = 0.212$ ,  $R^2$  change =  $0.077$ ,  $p < 0.001$ ), 2.5 % variability in GAD-7 scores ( $F = 11.478$ ,  $R = 0.333$ , *adjusted*  $R^2 = 0.101$ ,  $R^2$  change =  $0.025$ ,  $p = 0.001$ ), and 1.5 % variability in SWLS scores ( $F = 6.960$ ,  $R = 0.265$ , *adjusted*  $R^2 = 0.060$ ,  $R^2$  change =  $0.015$ ,  $p = 0.017$ ). For the full model statistics, please see **Table 3**.

## Mental Health Status and Change in MVPA

ANOVAs were conducted to examine whether degree of mental health symptomatology (e.g., none, mild, moderate, or severe) was associated with the extent to which MVPA changed from pre-COVID to during-COVID. In all analyses, significant differences were found. Bonferroni corrected *post-hoc* testing uncovered differences within the classifications of depressive symptoms, anxiety symptoms, and life satisfaction. Graphs displaying between-group differences can be found in **Figure 1**.

**TABLE 2** | Correlations between mental health, gender, age, BMI, and change in MVPA.

	PHQ-9	Gender	Age	BMI	MVPA (change)
PHQ-9	1.00				
Gender	0.022	1.00			
Age	$-0.348^*$	$0.111^*$	1.00		
BMI	$0.87^*$	$0.117^*$	$0.159^*$	1.00	
MVPA (change)	$-0.284^*$	$-0.067$	$0.008$	$-0.007$	1.00
	GAD-7	Gender	Age	BMI	MVPA (change)
GAD-7	1.00				
Gender	$-0.01$	1.00			
Age	$-0.267^*$	$0.111^*$	1.00		
BMI	$0.076$	$0.117^*$	$0.159^*$	1.00	
MVPA (change)	$-0.161^*$	$-0.067$	$0.008$	$-0.007$	1.00
	SWLS	Gender	Age	BMI	MVPA (change)
SWLS	1.00				
Gender	$-0.033$	1.00			
Age	$0.288^*$	$0.111^*$	1.00		
BMI	$0.042$	$0.177^*$	$0.159^*$	1.00	
MVPA (change)	$0.126^*$	$-0.067$	$0.008$	$-0.007$	1.00

\*Significant with Bonferroni correction.

## PHQ-9

For the PHQ-9, significant between-group differences were found ( $F = 62.206$ ,  $p < 0.001$ ). Follow-up analysis indicated significant differences between participants with no symptoms relative to those with mild ( $MD = -155.730$ ,  $SE = 45.256$ ,  $p = 0.006$ ), moderate ( $MD = 286.193$ ,  $SE = 41.403$ ,  $p < 0.001$ ), moderate-severe ( $MD = -285.345$ ,  $SE = 69.902$ ,  $p = 0.001$ ), and severe symptomatology ( $MD = 718.765$ ,  $SE = 61.576$ ,  $p < 0.001$ ).

Additionally, significant between-group differences were found between PHQ-9 severity of mild in comparison to moderate ( $MD = 441.923$ ,  $SE = 50.438$ ,  $p < 0.001$ ) and severe ( $MD = 874.495$ ,  $SE = 67.689$ ,  $p < 0.001$ ). There were also significant between-group differences found between PHQ-9 severity of moderate in comparison to moderate-severe ( $MD = -571.538$ ,  $SE = 73.094$ ,  $p < 0.001$ ) and severe ( $MD = 432.571$ ,  $SE = 65.176$ ,  $p < 0.001$ ). Finally, there was also a significant between-group difference found between PHQ-9 severity of moderate-severe in comparison to severe ( $MD = 1004.110$ ,  $SE = 86.140$ ,  $p < 0.001$ ).

## GAD-7

For the GAD-7, significant between-group differences were found ( $F = 4.026$ ,  $p = 0.008$ ). Follow-up analyses indicated significant differences between participants with no anxiety symptoms relative to those with mild ( $MD = 137.031$ ,  $SE = 49.703$ ,  $p < 0.037$ ) and moderate symptoms ( $MD = 186.781$ ,  $SE = 68.671$ ,  $p = 0.041$ ).

## SWLS

In terms of the SWLS, significant between-group differences were found ( $F = 13.840$ ,  $p < 0.001$ ). Follow-up analyses identified

**TABLE 3** | Results of hierarchical regression analyses, examining associations between change in MVPA and mental health outcomes.

Model	R	R Square	Adjusted R Square	Std. Error of the estimate	Change Statistics					
					R Square Change	F Change	Df1	Df2	Sig. F change	
<b>PHQ-9</b>										
1	0.379 <sup>a</sup>	0.144	0.137	5.47	0.144	20.784	3	371	< 0.001	
2	0.470 <sup>b</sup>	0.212	0.212	5.23	0.077	36.423	1	370	< 0.001	
<b>GAD-7</b>										
1	0.293 <sup>a</sup>	0.086	0.079	5.378	0.086	11.595	3	370	< 0.001	
2	0.333 <sup>b</sup>	0.111	0.101	5.312	0.025	10.257	1	369	0.001	
<b>SWLS</b>										
1	0.235 <sup>a</sup>	0.055	0.048	6.483	0.055	7.256	3	371	< 0.001	
2	0.265 <sup>b</sup>	0.070	0.060	6.442	0.015	5.791	1	370	0.017	

<sup>a</sup>Predictors (Age, Gender, BMI).

<sup>b</sup>Predictors (Age, Gender, BMI, MVPA (change)).

significant difference between those who were extremely satisfied in comparison to satisfied ( $MD = 327.472$ ,  $SE = 84.411$ ,  $p = 0.004$ ), neutral ( $MD = 632.609$ ,  $SE = 103.992$ ,  $p < 0.001$ ), slightly dissatisfied ( $MD = 458.609$ ,  $SE = 95.646$ ,  $p < 0.001$ ), dissatisfied ( $MD = 446.894$ ,  $SE = 99.916$ ,  $p < 0.001$ ) and extremely dissatisfied ( $MD = 842.609$ ,  $SE = 123.199$ ,  $p < 0.001$ ).

Additionally, significant between-group differences were found between the SWLS rating of satisfied in comparison to neutral ( $MD = 305.137$ ,  $SE = 73.348$ ,  $p < 0.001$ ) and extremely dissatisfied ( $MD = 515.137$ ,  $SE = 98.709$ ,  $p < 0.001$ ). Significant between-group differences were found between the SWLS rating of slightly satisfied and neutral ( $MD = 408.500$ ,  $SE = 76.468$ ,  $p < 0.001$ ), slightly dissatisfied ( $MD = 234.500$ ,  $SE = 64.662$ ,  $p = 0.007$ ), dissatisfied ( $MD = 222.786$ ,  $SE = 70.825$ ,  $p = 0.037$ ) and extremely dissatisfied ( $MD = 618.500$ ,  $SE = 101.050$ ,  $p < 0.001$ ). Significant between-group differences were found between the SWLS rating of slightly dissatisfied and extremely dissatisfied ( $MD = 384.000$ ,  $SE = 106.887$ ,  $p = 0.008$ ). Finally, a significant between-group difference was found between SWLS rating of dissatisfied and extremely dissatisfied ( $MD = 395.714$ ,  $SE = 110.724$ ,  $p = 0.008$ ).

## MVPA Guidelines and Mental Health

*T*-tests were completed to determine if differences in total score of mental health measures (PHQ-9, GAD-7, SWLS) existed between individuals who were sufficiently active for health benefits vs. those who were insufficiently active. Analyses were conducted twice, on pre-COVID and during-COVID levels of activity. Graphs displaying between-group differences can be found in **Figure 2**.

### PHQ-9

Participants who were sufficiently vs. insufficiently active pre-COVID did not significantly differ in their during-COVID PHQ-9 scores ( $t = 1.234$ ,  $df = 288.272$ ,  $p = 0.218$ ,  $MD = 0.800$ ). However, significant differences were observed between individuals who were sufficiently vs. insufficiently active during COVID ( $t = 13.400$ ,  $df = 237.514$ ,  $p < 0.001$ ,  $MD = 8.074$ ), with sufficiently active individuals reporting lower PHQ-9 scores.

### GAD-7

Participants who were sufficiently vs. insufficiently active pre-COVID did not differ in their during-COVID GAD-7 scores ( $t = 3.427$ ,  $df = 165.512$ ,  $p = 0.001$ ,  $MD = 2.372$ ). Significant differences were observed between individuals who were sufficiently vs. insufficiently active during COVID ( $t = 10.907$ ,  $df = 238.454$ ,  $p < 0.001$ ,  $MD = 5.706$ ), with sufficiently active individuals reporting lower GAD-7 scores.

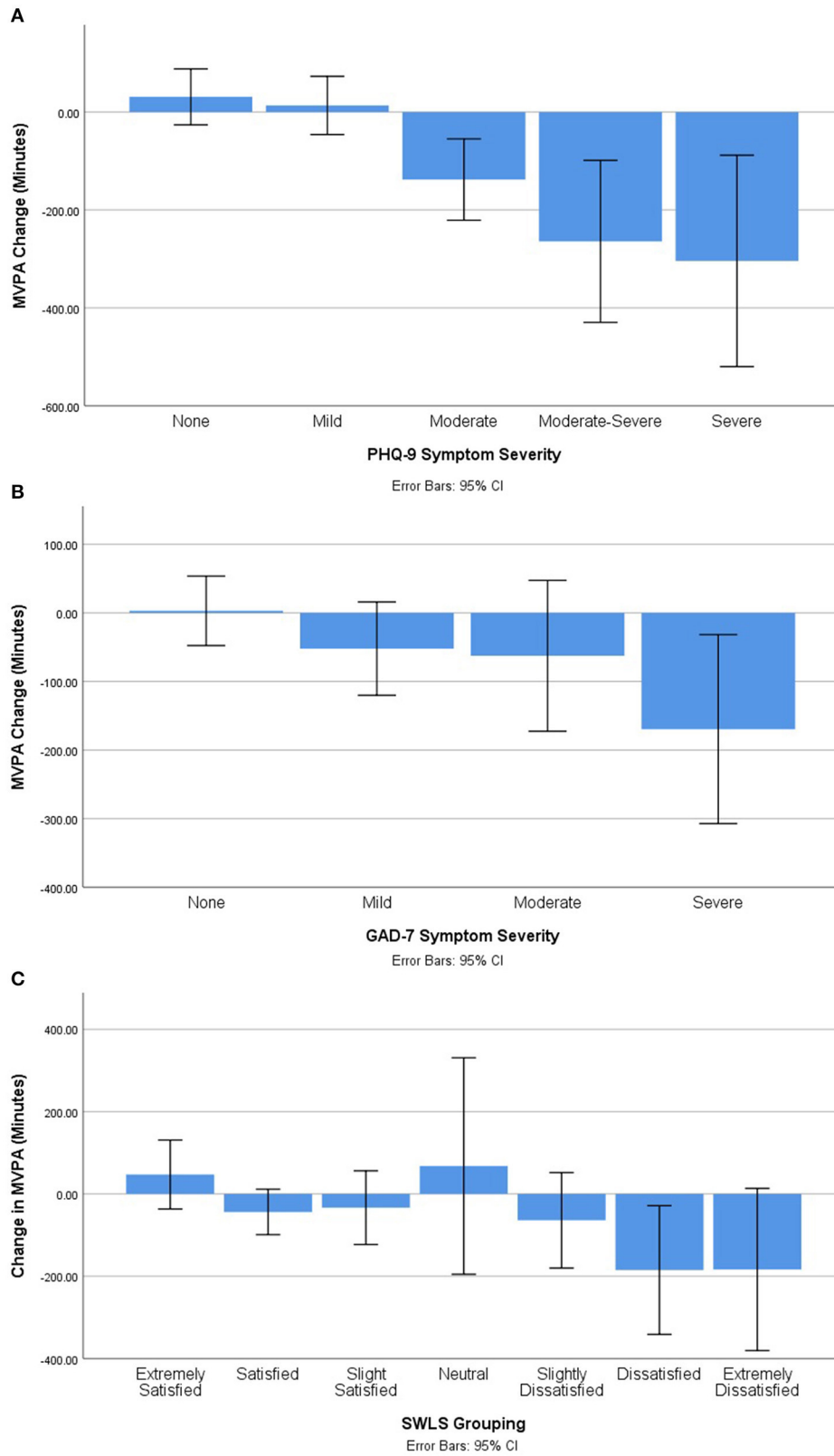
### SWLS

Participants who were sufficiently vs. insufficiently active pre-COVID did not differ in their during-COVID SWLS scores ( $t = -1.335$ ,  $df = 180.246$ ,  $p = 0.183$ ,  $MD = -1.026$ ). Significant differences were observed between individuals who were sufficiently vs. insufficiently active during COVID ( $t = -4.832$ ,  $df = 217.060$ ,  $p < 0.001$ ,  $MD = -3.332$ ), with sufficiently active participants reporting higher life satisfaction.

## DISCUSSION

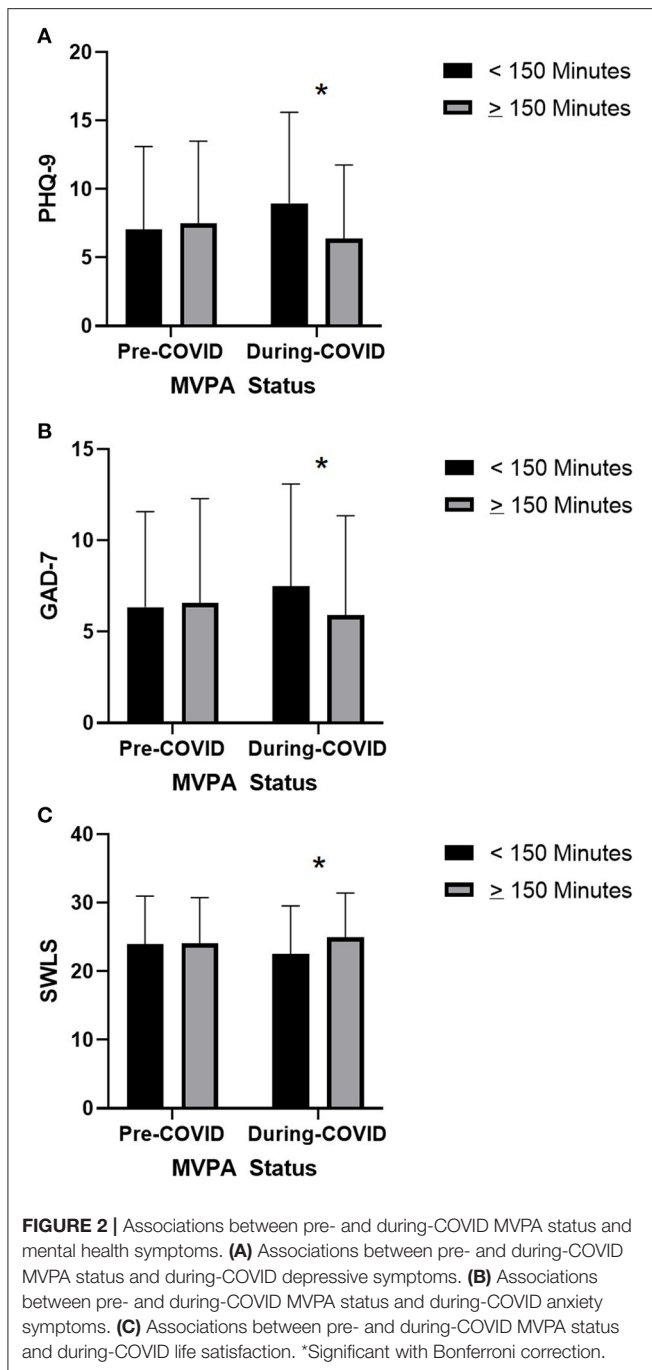
The COVID-19 pandemic is an unprecedented public health event that presents a significant risk to human health and well-being (19, 20, 30). Efforts to slow the pandemic have required significant changes to “everyday life,” with one unintentional consequence being reductions in PA (22, 46). The purpose of the current manuscript was to investigate whether changes in MVPA during the early stages of the COVID pandemic were associated with mental health outcomes, specifically, depressive symptomatology, anxiety symptomatology, and life satisfaction.

Overall results suggest a positive association between mental health and change in MVPA among this sample of highly active participants. Individuals who reported larger decreases in MVPA pre- to during-COVID reported relatively poorer mental health as indicated by higher depression and anxiety symptoms, and lower life satisfaction. Between-group analyses found significant differences across mental health categorizations, where individuals with the poorest mental health reported relatively greater changes in MVPA. For instance, with regards to depressive symptomatology, participants who reported no or mild symptoms reported small increases in MVPA. Those



**FIGURE 1 |** Change in self-reported MVPA by mental health status. **(A)** Self-reported change in MVPA by depressive symptom severity. **(B)** Self-reported change in MVPA by anxiety symptom severity. **(C)** Self-reported change in MVPA by life satisfaction grouping.





with moderate, moderate-severe, and severe symptoms reported reduced MVPA in a gradient fashion that corresponded with symptom severity (Figure 1A). Similar trends were observed with regards to anxiety symptoms and life satisfaction.

Our findings are consistent with those reported in a rapid review that has not yet undergone peer review. Wolf et al. (47) reviewed evidence examining the association between physical activity and depression and anxiety during the COVID-19 pandemic. They identified a total of 21 observational studies (four longitudinal, one cross-sectional with retrospective analysis, and

16 cross-sectional). Their synthesis suggests that people who participated in physical activity on a regular basis with higher volume and frequency and kept their physical activity routines stable in the first few months of the pandemic, showed less symptoms of depression and anxiety. Specifically, those reporting a higher total time spent in moderate to vigorous PA had 12 to 32% lower chances of presenting with depressive symptoms and 15 to 34% lower chances of presenting with anxiety.

A significant body of research conducted prior to COVID indicates a positive relationship between mental health and physical activity (6, 7, 13). The results of the current study and the greater literature (47, 48) suggest that such associations hold true during a period of pandemic and significant socioeconomic disruption. Indeed, given both the extent and severity of disruptions, it is remarkable that a significant proportion of depressive symptomatology – 7.7% of variance accounted for – was associated with MVPA. Though relatively small at an individual level, MVPA may serve as a significant contributor to poor mental health when expanded to the population (49). Additionally, there have been significant and sustained reduction in light physical activity (LPA) during the COVID pandemic (22). LPA is also associated with poor mental health outcomes even when MVPA is controlled for (50), which was not accounted for in the current study. We strongly encourage future research to examine longitudinal associations between all types of physical activity and mental health across the duration of the COVID pandemic.

### The Role of Past Activity

Between-group analyses of sufficiently and insufficiently active individuals revealed an intriguing pattern of results. Whereas, previous research has found MVPA to be protective against psychological distress and mental illness (6, 51–53), participants' retrospectively-reported MVPA did not appear to mitigate mental health symptomatology reported during COVID. That is, participants who were sufficiently vs. insufficiently active *prior to* COVID did not differ in their mental health outcomes *during* COVID. In contrast, significant between-group differences were observed cross-sectionally between sufficiently vs. insufficiently active individuals, with sufficiently active individuals reporting better mental health. The non-significant effect of pre-COVID MVPA may be due to study methodology, in that participants were asked to retrospectively recall their level of physical activity before COVID (54, 55). Alternatively, the COVID pandemic and its resulting impact on mental health (30) may have presented participants with unique biopsychosocial stressors, which dampened the benefits of pre-COVID MVPA on mental health. Further investigation into this observation is warranted.

### Psychological Distress

Within the current study, the majority of participants reported some degree of psychological distress: 62.0% reporting depressive symptoms and 53.7% reporting anxiety. A notable minority reported depressive and/or anxiety symptoms at or above the PHQ-9 and GAD-7 threshold scores of 10: 28.1 and 26.5%, respectively. The occurrence of clinically significant psychological distress in this study is significantly higher than

what is typically found in surveys of the general population. For instance, Kocalevent et al. (56) found 5.6% of individuals reported a PHQ-9 score  $\geq 10$ ; whereas Lowe et al. (57) found that 5.1% of individuals reported a GAD-7 score  $\geq 10$ . Notably, the results from the current study – with a predominantly North American sample – are similar to those reported in China (58) and the United Kingdom (59) during the COVID pandemic. While further investigation is required, the consistency of findings (30) suggest that a five-fold increase in the prevalence of psychological distress may be typical during a period of pandemic.

## Strengths and Limitations

The current paper examines relationships between physical activity and mental health during a period of pandemic in an English-speaking population. Additional strengths include the use of validated clinical mental health measures that included measures of both psychological distress (PHQ-9 and GAD-7) and mental well-being (SWLS), and a validated self-report measure of physical activity. With regards to limitations, participants in this study were primarily younger adults, female, well-educated, from North America, and reported relatively high levels of physical activity (pre- and during-COVID). Consequently, results may not be generalizable to other populations. As this is a cross-sectional study, cause-effect relationships cannot be inferred from results. Additionally, there are a significant number of other factors that may account for poor mental health during the pandemic, such as less socialization, that were not controlled for in the current study. Further research utilizing more diverse samples and a longitudinal design will be useful for understanding associations between physical activity, health, and mental health during COVID.

## Implications for Health and Public Health Professionals

There is growing evidence that the COVID pandemic has negatively impacted both mental health (30, 58, 59) and physical activity (22, 46). The results of this research illustrate a positive association between mental health and MVPA in the early stages of the COVID pandemic, with sufficiently active individuals reporting lower depressive and anxiety symptoms, and higher quality of life. Conversely, individuals with poorer mental health reported greater decreases in MVPA. While the cross-sectional nature of these results prevents examination of causation, the consistency of associations between physical activity and mental health outcomes is noteworthy. Given what is known about the physical (1) and mental health (5–7) benefits of physical activity, it is prudent to promote physical activity involvement as a mechanism for promoting health and well-being during the COVID pandemic. Individuals who maintained their levels of physical activity demonstrated less psychological disturbance. A priority for future research is examining factors that support this resilience. For example, some active adults may have been creative in their home-based leisure activities, using online health and/or physical activity apps, or getting outdoors as much as possible (while following public health requirements). Implementing safe physical distancing measures that provide extra space for everyone to walk or cycle are likely essential.

This could include temporary reallocation of roadway space and keeping expansive green spaces open to public access.

## CONCLUSIONS

The purpose of the current study was to examine associations between physical activity, mental health, and mental illness during the COVID-19 pandemic. In line with emerging literature (47), individuals who maintained their levels of physical activity demonstrated less psychological disturbance. Results indicate a positive association between changes in MVPA and mental health, where those who experienced the greatest decline in MVPA reported relatively greater psychological distress and lower life satisfaction. Though further research is required to examine longitudinal trends, these early findings speak to the importance of maintaining and promoting physical activity during a period of pandemic. Public health initiatives that support safe physical activity while ensuring physical distancing are likely an important foundation for many adults to initiate or maintain physical activity in the case of future waves of the COVID pandemic, or in the case of future pandemics.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the authors upon reasonable request.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by The University of British Columbia Research Ethics Board (#H20-00899). The participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MG and NR conceived and designed the study and methods. MG and MF cleaned, analyzed, and interpreted the data. MG drafted the manuscript. All authors provided feedback on study design and assisted with participant recruitment and manuscript revisions.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Mental Illness in the Post-pandemic World: Digital Psychiatry and the Future

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## BACKGROUND

The World Health Organization declared the novel coronavirus disease 2019 (COVID-19) outbreak a global health emergency in January 2020. Rates of infection and consequently, mortality have risen rapidly, resulting in a global pandemic. With no evidence-based treatments available, most countries have implemented quarantine measures to mitigate the spread of the virus. The world has largely focused on the physical suffering associated with COVID-19. However, the mental health sequelae of the pandemic are beginning to gain deserved attention. COVID-19 poses unique challenges to population mental health, given the colossal societal impact of nationwide lockdowns and health services struggling to cope. Mental health and well-being have been adversely affected by direct exposure to the virus (e.g., depression, anxiety, grief, suicidality) and from the social and economic upheaval that is occurring at an individual and population level (Reger et al., 2020; Wind et al., 2020). The economic down turn in the context of COVID-19 is a major concern, with psychological distress and suicide rates potentially rising on the back of sustained financial stress (Reger et al., 2020). The Severe Acute Respiratory Syndrome (SARS) epidemic of 2003 has taught us that psychological distress can affect both patients and clinicians treating them during an outbreak and continue in its aftermath (Lee et al., 2007). Amidst COVID-19, health services have had to adapt rapidly, implementing new ways of working to meet the rising demands of the population. However, across health settings, there is considerable variation with some institutions lacking the necessary resources, infrastructure, training, and support to allow clinicians to deliver mental health care in an era of physical distancing. Based on collective clinical experience, we provide a commentary on the rapid transition from in-person or traditional psychiatric care, to virtual mental health care (telepsychiatry) in response to COVID-19 and discuss the advantages, disadvantages and implications of digital psychiatry now and in the post-pandemic world.

## COVID-19 AND THE ACCELERATION OF DIGITAL PSYCHIATRY

Over the past two decades, digital psychiatry has continued to evolve as a cost-effective means to improve access to care for psychiatric patients. Digital psychiatry is an umbrella term that includes digital interventions delivered through applications (web and mobile based) as well as the delivery of telemental health care through virtual (videoconferencing) platforms. The majority of this commentary focuses on the latter, which we will refer to as telepsychiatry and virtual care.

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The burden of mental disorders has not been matched by the appropriate resources and services necessary to treat them, resulting in a large mental health treatment gap. There is hope that digital psychiatry can bridge this gap, improving access to treatment, and hence outcomes for people with mental disorders. Evidence supports the use of digital psychiatry as a feasible platform, acceptable to users as well as effective in improving outcomes and quality of life across a variety of mental disorders (Bashshur et al., 2016). Literature is primarily based on mood and anxiety disorders, with an under-representation of psychosis (Bashshur et al., 2016). Furthermore, the intervention modality most commonly used in digital mental health studies is Cognitive Behavior Therapy (CBT) (Bashshur et al., 2016). Therefore, caution must be exercised when generalizing the enthusiasm of digital mental health care across the spectrum of severe mental illness. Nonetheless, there are published best practice guidelines on the use of virtual platforms for the delivery of care by the American Telemedicine Association and the American Psychiatric Association (Shore et al., 2018). In Ontario, Canada, the Ontario Telemedicine Network (OTN) a non-profit initiative was formed in the late 1990's as a means to connect individuals in remote areas to quality care (Brown, 2013). Telepsychiatry has continued to develop over the past two decades with evidence supporting its equivalence to face-face care with regards to therapeutic alliance and patient satisfaction (Hilty et al., 2013; Parish et al., 2017). Although there are few randomized controlled trials comparing traditional in-person mental health care with virtual care, evidence from systematic reviews and meta-analyses have indicated that treatment effects are largely equivalent when both approaches are compared (Bashshur et al., 2016; Langarizadeh et al., 2017; Batastini et al., 2020).

Although telepsychiatry has faced a number of obstacles to implementation, in the context of the COVID-19 pandemic, many perceived barriers to the adoption of virtual care have now been overcome across the world (Mann et al., 2020; Perez Sust et al., 2020). The meteoric rise of telepsychiatry has been felt world over. In the UK, the National Health Service facilitated the rapid ramp up of virtual psychiatric care despite pre-existing cautionary guidance from the Royal College of Psychiatrists (Dave et al., 2020). The Australian health service provider, Medicare, moved to support telehealth solutions to allow mental health services to provide care seamlessly despite physical distance restrictions being placed on the population (Davenport et al., 2020). In the 6-weeks between mid-March and April, 2020 when Medicare began funding telemental health, 35 million Australian dollars were spent on these services (Rosenberg et al., 2020). Countries like Israel, Singapore, Korea and Taiwan have successfully managed the COVID-19 pandemic by responding rapidly and relying heavily on technology (Salvador-Carulla et al., 2020). Although low and middle-income countries have seen a rise in telepsychiatry as well, the full potential of using virtual platforms in these settings is yet to be realized (Naeem et al., 2020). Telepsychiatry represents a viable resource in overcoming the significant mental health gap in low and middle-income countries. However, the proliferation of telepsychiatry in these contexts is often undermined by lack of telehealth infrastructure, national telehealth policies, data governance frameworks and

lack of training and education on the use telehealth technologies for the health-workforce (Naeem et al., 2020).

## VIRTUAL CARE AT THE CENTRE FOR ADDICTION AND MENTAL HEALTH (CAMH)

The COVID-19 pandemic poses a serious challenge for mental health services across the globe. There has been a rapid uptake of virtual healthcare delivery by a number of mental health providers in preparation for the mental health pandemic that is likely to follow COVID-19. Pre-pandemic, the Centre for Addiction and Mental Health (CAMH), Canada's largest mental health teaching hospital, prioritized the innovation and expansion of telepsychiatry services. However, the implementation of these services across the organization had taken years to fully establish. Since the start of the COVID-19 pandemic, the acceleration of telepsychiatry has been meteoric, with virtual platforms being utilized to deliver patient care. In the US this uptake of virtual care has been facilitated by the relaxation of privacy legislation, augmentation of physician remuneration policies, and prescribing policies (Torous et al., 2020). Similarly, in Canada there has been a change in regulations and the introduction of COVID-19 specific billing codes as a means to increase access to virtual care across medical specialties (Ontario Ministry of Health Ministry of Long-Term Care, 2020). CAMH became entirely digitized in a matter of days, successfully expanding virtual care provision to meet the mental health demands of the population. In 2019 CAMH delivered virtual care to over 3,000 patients from over 550 communities across Ontario (D'Andrea, 2020). This figure increased by over 750 percent from March to April of 2020, with over 3,000 virtual care visits being provided per month (D'Andrea, 2020). The number of mental health providers trained to deliver virtual care also increased from 30 practitioners to over 400 (D'Andrea, 2020). CAMH is an example of the adaptability mental health services need to display in order to meet the demands of the populations they serve. In our experience, feedback from colleagues and patients has been overwhelmingly positive. Clinical staff are finding that remote working has provided more flexibility in their clinical schedules as well as making them more time-efficient. Feedback from service users echo the flexibility and convenience aspect, but also report cost and time saving (less waiting, no cost of transport or parking). Dr. Catherine Zahn, President and CEO of CAMH, has stated that "*virtual health platforms will be a permanent and growing fixture of the healthcare system, and be offered as an accessible, flexible and secure mental health care option for patient care going forward.*" CAMH is now creating training programs for other hospitals and community-based healthcare providers to help scale capacity to deliver mental health services virtually elsewhere.

## POTENTIAL PITFALLS OF DIGITAL PSYCHIATRY

Despite its advantages, telepsychiatry is not a panacea, and there are potential harms that must be considered. Virtual care is

inherently associated with a degree of risk where data breaches and compromise to patient confidentiality and privacy are concerned (Lustgarten et al., 2020). The use of virtual platforms with built-in data encryption, adware, and malware protection, as well as firewalls, has been endorsed as a means to mitigate risks of data breaches (Barnett, 2019). Furthermore, ensuring robust consent procedures is of utmost importance. During this process, the risks to privacy and confidentiality should be clearly explained to patients, along with the limitations of the safeguards that are in place to prevent breaches. Patients should be advised to engage in consultations in a private space as confidential information may be discernable to individuals in their proximity. When delivering telepsychiatric care there are legal implications related to jurisdiction and licensure, where provision of care must be restricted to the province or state that the practitioner is licensed in. Confirmation of identity and identity fraud is another legal concern. There are also implications with regards to involuntary admissions and collaborative arrangements with law enforcement, health and social services to facilitate them. Ultimately, there is the inevitable risk of being unable to respond to psychiatric emergencies in a timely manner. All virtual health platforms inherently carry this risk and therefore guidance from the APA and the OTN pertain specifically to it, with advice that clinicians should ensure there is consistency in where the patient is located during sessions, along with having access to emergency contact information (a friend or family member of the patient) and knowledge of local resources in the event of a crisis (e.g., police, emergency medical services etc.) (Shore et al., 2018).

It is important to recognize that though virtual platforms can improve access to care for some individuals, others may not be able to take advantage of them (Strudwick et al., 2020). There are many barriers to successful uptake of telepsychiatry services including accessibility (e.g., access to internet and smartphones), user ability, provider competency, as well as language and cultural appropriateness (Strudwick et al., 2020). Patients with schizophrenia are known to have cognitive impairment (Husain et al., 2018), which may hinder their ability to engage with telepsychiatry. People experiencing homelessness may also be disproportionately excluded from accessing appropriate care and interventions if largely delivered virtually. Individuals in later life may be less proficient with virtual platforms. To address these factors, a collaborative approach with all relevant stakeholders (service users, clinicians, academics, policymakers) is necessary to develop telepsychiatry services that are inclusive and meet the diverse needs of the population. We must be cautious not to widen the existing mental health gap for already hard-to-reach groups, including people from racialized communities and those living in rural areas where connectivity may be limited. Hard-to-reach individuals are often those with the highest need for care and it is essential that future developments in telepsychiatry ensure parity of access.

We acknowledge that telepsychiatry is not a “one size fits all.” There may well be certain patient groups that are not suitable for virtual care but the literature on the unintended harms of telepsychiatry is scant. Although telepsychiatry has been reported to be effective and satisfactory to addiction

medicine patients, there are no reports to our knowledge on the use of virtual platforms for individuals with internet or gaming addiction. There is a need to develop the evidence base for potential unintended harms associated with virtual care in the future. How much is too much? The potential impact of screen time on cognitive function and executive function is yet to be determined (Minielly et al., 2020). Nonetheless, in the context of the ongoing global pandemic at present the balance remains in favor of telepsychiatry, vs. no care at all.

## DIGITAL PSYCHIATRY IN THE POST-PANDEMIC SETTING

Although the rapid uptake of virtual care has been a product of necessity, the COVID-19 pandemic may have fundamentally changed the way mental health care is delivered. Historically, reluctance to accept telepsychiatry has been centered around the building of rapport and therapeutic relationships (Torous and Wykes, 2020). Appropriate investment is needed for clinician training to deliver virtual care, which has the potential to help the many who will experience mental health fallout from the COVID-19 pandemic but may also redefine “*digital mental health as simply mental health*” in the post-pandemic era (Torous et al., 2020). Furthermore, investment is required in the development of new technologies alongside the development and testing of apps to support the delivery of digital health. We must consider the enhancement and repurposing of existing infrastructure, for example phonebooths equipped with built-in tablet devices that would allow individuals without access to digital platforms to engage. Parity of care could also be achieved by initiatives that offer mobile devices to those unable to afford them. “Virtual walk-in centres” can also be developed by allocating spaces in hospitals and walk-in centres where patients can utilize designated computers or tablet devices. Digital health literacy needs to be enhanced through targeted education interventions to reduce the disparity in access to digital care. These strategies would enhance digital inclusion and potentially address health inequality in the future where digital platforms are likely to form a large part of healthcare delivery (Farooq et al., 2015). The evolution of digital health care requires clinicians, academics, funders, developers and policy makers to collaborate and develop the evidence base of real-world pragmatic effectiveness trials of virtual care platforms, e-therapies, apps, wearable technology and actigraphy. Future directions for research include rigorous and robust clinical effectiveness trials that compare virtual care with in-person care, as well as clinical trials including a variety of mental health presentations and service settings. We will only then be able to determine what works best for who. More research is also needed on the use of mobile applications and artificial intelligence (AI). AI informed mobile applications have the potential to offer personalized real time intervention and provide immediate response to the changing needs of the patient. We have achieved Digital Psychiatry 1.0, allowing us to connect better with our patients (virtual care vs. in person). Digital Psychiatry 2.0 needs to move past connection and toward the

empowerment of patients through remote monitoring of their mental health and real-time interventions by clinicians. Such a platform would not only improve access to mental health care, but invariably lead to a more responsive mental health care system that would improve patient outcomes in the post-pandemic world.

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MOH and MIH conceived the idea for this paper and led in the writing of the manuscript. DG and FN helped with drafting the manuscript. All authors approved the final draft prior to submission.

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# Coronavirus Awareness and Mental Health: Clinical Symptoms and Attitudes Toward Seeking Professional Psychological Help

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The current study analyzed the relationship between Coronavirus (COVID-19) Awareness, mental health, and willingness to seek professional psychological help. This was made through a quantitative approach, using online questionnaires to collect data from 855 subjects. The questionnaires included the Brief Symptom Inventory (BSI-53) to measure mental health indicators, the Attitudes Toward Seeking Professional Psychological Help Scale–Short Form, and the Coronavirus Awareness Scale-10 (CAS-10). An Exploratory Factor Analysis suggests that three factors underlie the CAS-10: Coronavirus Concern, Exaggerated Perception, and Immunity Perception. Results indicate a significant positive correlation between Coronavirus Concern and both general anxiety and phobic anxiety symptoms. Immunity Perception is positively related to paranoid ideation and psychotic symptoms. A Mediation Analysis determined that Coronavirus Concern has a significant positive direct effect on Openness to Seeking Psychological Treatment (OSPT), while Exaggerated Perception and Immunity Perception scores have significant direct negative effects on the Value and Need in Seeking Treatment (VNST) scores. Indirectly, the relationship between Coronavirus Concern and OPST is significantly mediated by anxiety symptoms. Similar results were found for the VNST subscale. There is a negative significant effect of Immunity Perception over OSPT mediated by Paranoid Ideation. However, the overall model only achieved small  $r^2$  coefficients for the OSPT (0.060) and VNST (0.095) scores. Comparisons in Coronavirus Awareness between sex, age, and the presence of children and older adults at home were also made. These results are discussed regarding their practical implications for mental health providers and policymakers.

**Keywords:** pandemics, mental health, psychological help, health psychology, public health

## INTRODUCTION

### Origins of COVID-19

Coronavirus is one of the most important pathogens that causes respiratory infections in humans. On December 2019, an outbreak of pneumonia of unknown cause was reported in the city of Wuhan, China. By January 2020, the pathogen was isolated from these patients and was identified as a novel Coronavirus (Severe Acute Respiratory Syndrome-Coronavirus 2). It was highly suspected that the outbreak started in a Huanan seafood market, a place where live animals such as bats, birds, snakes and frogs were sold (Shereen et al., 2020). This disease is highly contagious, initially from zoonotic transmission, and later from human to human, by coughing, sneezing or having close contact with an infected person's respiratory droplets (Rothan and Byrareddy, 2020; Shereen et al., 2020).

The most common symptoms of COVID-19 illness are fever, cough, dyspnea, and myalgia. Populations at higher risk include older adults and people with underlying conditions like diabetes, hypertension, or coronary heart disease (Mesa Vieira et al., 2020). In such cases, health complications can quickly progress to Acute Respiratory Distress Syndrome (ARDS) or end-organ failure (Wu et al., 2020).

On the other hand, the evidence shows that only a small number of children that are COVID-19 positive develop a severe health condition. However, asymptomatic children could be playing a relevant part in the spread of the virus (Dervrim and Bayram, 2020). It's important to reduce the increasing cases to avoid a higher fatality rate, especially for healthcare systems that are not prepared for this kind of pandemic, like in the Latin American region (Rodríguez-Morales et al., 2020).

### Prevalence of COVID-19

The World Health Organization (2020a) at the beginning of 2020 considered the outbreak of COVID-19 an international public health emergency. The virus kept spreading quickly in a great number of territories around the world, by March of 2020 it was cataloged as a pandemic. By May 27th, 2020, this number increased considerably, registering 5,491,678 confirmed cases and 349,190 deaths worldwide, with a great prevalence of cases in the American region (World Health Organization, 2020b). The spreading of Coronavirus in Latin American countries has presented an aggressive dynamic that suggests a difficult scenario for low-income nations (Caicedo-Ochoa et al., 2020). In the case of Honduras, by the date data for this research was collected (16th–23rd of March), the virus was just beginning to spread, with 30 confirmed cases and 0 deaths. By May 27th, 2020, these numbers increased alarmingly, reaching 4,401 confirmed cases and 188 fatalities (Honduras Health Secretary, 2020).

### Mental Health in the Context of COVID-19

According to the World Health Organization (2003), mental health is an important part of the human condition, along with the physical and social domains. Mental health concepts are related to subjective well-being, autonomy, the capability of

identifying one's potential, the ability to manage stress, work in a productive way and be capable of contributing to their social environment. Mental health is associated with a balance between the person and the environment. This is influenced by a series of biological, psychological, social, and cultural factors (Korkeila et al., 2003). Recent outbreaks such as SARS, Zika, MERS, and Ebola have shown that a health crisis is a stressful situation. These concerns may be related to the risk of acquiring the virus or passing it on to others, the presence of symptoms of other health conditions that could be confused with COVID-19, and physical and mental health deterioration in vulnerable populations. Other concerns are related to the uncertainty of the long-term consequences in the health, social and economic domains (Huremović, 2019; Inter-Agency Standing Committee, 2020; Wang et al., 2020).

The constant fear of becoming infected or dying, as well as seeing other people die, are just one of the effects caused by outbreaks of epidemics and pandemics on mental health. People who become infected may be attacked and marginalized because they are perceived as "contaminated" (Huremović, 2019; Wang et al., 2020). Likewise, there is a direct correlation between the growing crisis and the negative impact on the economy, health and educational systems (Sim et al., 2010; Van Bortel et al., 2016). This vulnerability can also be related to mental health issues to specific populations like older adults (El Hayek et al., 2020).

One of the most relevant public health measures to reduce the number of people infected with COVID-19 has been social distancing and quarantine (Wilder-Smith et al., 2020). Quarantine has shown to have negative psychological effects on people with and without pre-existing mental health problems. People under quarantine may experience symptoms related to anxiety, depression, and post-traumatic stress symptoms (Brooks et al., 2020). In addition, media can influence the public by doing "agenda-setting," which occurs when a problem receives massive coverage, making it more important to the public (Rubin et al., 2010; Rubin and Wessly, 2020). People's lack of knowledge about a disease leads to misinformation and the spread of rumors, which could lead to harmful effects on mental health (Fernández Poncela, 2012).

Although there are many instruments designed to screen psychological symptoms, the Brief Symptom Inventory-53 (BSI-53) has been widely used in different contexts. The BSI-53 measures symptoms related to Anxiety, Depression, Phobic Anxiety, Hostility, Interpersonal Sensitivity, Obsessive-Compulsive traits, Paranoid Ideation, Psychoticism, and Somatization (Derogatis, 1993). The following description provides a brief overview of these symptoms during the pandemic and confinement period:

- Anxiety: the contextual presence of different diseases or viruses can cause anxiety in the general population. Specific outbreaks (like Zika, Ebola, etc.) may detonate diverse patterns of health anxiety responses (Blakey and Abramowitz, 2017). Recent research made within the COVID-19 outbreak suggests a high prevalence of anxiety symptoms among the population (Rajkumar, 2020).

- Depression: has been described as one of the most prevalent symptoms among the general population during the current COVID-19 pandemic (Rajkumar, 2020).
- Phobic anxiety: recent studies have concluded that the fear of COVID-19 is related to variables such as perceived infectability and germ aversion (Kwasi Ahorsu et al., 2020).
- Hostility: during the SARS outbreak of 2003, health-care workers who were in quarantine reported high levels of anger, frustration, and annoyance (Brooks et al., 2020).
- Interpersonal sensitivity: is defined as a disproportionate awareness of other people's conducts and emotions (Mushtaq et al., 2017). Limited research is available on the topic of interpersonal sensitivity in the context of COVID-19. However, there is evidence that suggests that such construct is an important factor when promoting social functioning in help-seeking individuals (Masillo et al., 2015).
- Obsessive-Compulsive symptoms: the COVID-19 outbreak may trigger such symptoms. This can be exacerbated by the biosecurity measures taken to prevent COVID-19, such as hand washing (quality and frequency), interaction with others with suspected exposure, excessive mediatic information, etcetera (Debanjan, 2020).

Paranoid Ideation: recent research suggests that subjects with a history of paranoid ideation may report high levels of fear related to COVID-19 transmission (Vinkers et al., 2020). A study in Indian population reported that a significant percentage of respondents showed health-related paranoia regarding COVID-19 (Roy et al., 2020).

- Psychoticism: a recent study concluded that some subjects who tested positive on COVID-19 presented stress-triggered psychotic symptoms. However, further research is yet needed on the subject to explore alternatives explications to this reaction (Ferrando et al., 2020).
- Somatization: is characterized by the presence of physical symptoms related to dysfunctional concerns. Recent evidence suggests that the current fear of COVID-19 infection may aggravate pre-existing conditions related to somatic symptom disorders (Colizzi et al., 2020).

However, the Latino population have a tendency to underestimate the relevance of mental health care (Liu et al., 2020; Torres et al., 2020). Latin American population tends to avoid seeking psychological help for fear of the diagnosis they may receive and its associated social stigma (Mascayano et al., 2015). Added to the above, are the religious and cultural beliefs in Latin America which could play an important role in the decision of not seeking psychological help (Caplan, 2019). Despite this cultural resistance, the School of Psychological Science of the National Autonomous University of Honduras, launched an online chat service to provide psychological help amidst the COVID-19 crisis. As of June 11, 2020, more than 711 persons had been attended through the application (School of Psychological Sciences, 2020). This data evidences the demand for mental health services among the Honduran population.

## COVID-19 Awareness

The present study takes into consideration Coronavirus Awareness in relation to mental health and attitudes toward seeking professional psychological help. Coronavirus Awareness is defined as the degree in which people are conscious of the meaning, implications, prevention strategies, and seriousness of the spreading of COVID-19. Recently, a study used Google Trends to analyze the search volume of queries regarding COVID-19 and related terms. The results indicate that people respond temporarily to local propaganda regarding the virus (indicating awareness), however, this attention spam had a short duration (Hu et al., 2020).

Research suggests that demographic variables, such as sex, may be related to Coronavirus Awareness. A study made within the United States of America (USA) context compared the proportion of female and male respondents who reported to be concerned about the COVID-19 situation. Results indicate that when compared to men, there is a higher proportion of women that claim to be concerned about their risk of exposure to COVID-19. Women are also more concerned about contagion risk in their families, loss of economic income and access to COVID-19 testing and treatment (Frederiksen et al., 2020).

Household configuration may also be related to Coronavirus Awareness. Men and women with children are more likely to report COVID-19 related concerns (risk of exposure and loss of economic income), when compared with people who do not have children (Frederiksen et al., 2020). In addition, older adults have a high COVID-19 physical vulnerability (Mesa Vieira et al., 2020) and are also exposed to the social, psychological and economic repercussions of the pandemic. Furthermore, quarantine measures have also promoted intergenerational cohesion, improving the bond older adults have with their own family members as well as with non-related younger people (Morrow-Howell et al., 2020). Age is another variable to consider when analyzing COVID-19 Awareness. Previous research in the United States concluded that the proportion of older adults (>60 years) reporting health-related concerns about the COVID-19 situation was higher than in younger adults (<60 years) (Hamel et al., 2020). However, no data is yet available for the Central American context.

## Purpose of the Study

Reflecting on what has been previously stated, the current study assumes the following premises: (a) the COVID-19 situation is considered a stressor (Wang et al., 2020), (b) stress is strongly related to the presence of mental health disorders (Wu et al., 2020), (c) subjective needs play an important role in help-seeking behaviors (Nagai, 2015); therefore, we propose to analyze a causal model based on these assumptions contextualized within the COVID-19 crisis (see **Figure 1**).

Consequently, the purpose of this study was to analyze the relationship between Coronavirus (COVID-19) Awareness with mental health indicators and the attitude toward seeking professional psychological help. Additional information regarding Coronavirus Awareness and demographic variables were also analyzed, such variables included: age, sex, presence



of children and older adults at home. To our knowledge, there are no studies in Honduras or the Central American region that evaluate the impact of the COVID-19 situation in mental health.

## MATERIALS AND METHODS

### Participants

#### Sampling Method

A total of 855 participants from Honduras answered an online survey that was spread through social media and by snow-ball sampling. This online method was selected given the country's quarantine regulations. Each survey was accompanied by an online informed consent which stated the purpose of the study, a confidentiality clause and the main researcher's contact information. The selection criteria for the participants included: (a) being 18 years or older, (b) currently residing in Honduras and, (c) agreeing with the informed consent statement; any violation of these criteria was considered a motive for exclusion.

#### Characteristics of the Participants

Of all the respondents, 307 (35.9%) were male and 548 (64.1%) female. The average age for male participants was of 27.619 years ( $SD = 10.284$ ), while female mean age was 28.755 ( $SD = 10.878$ ), however, this difference is not statistically significant,  $t(853) = -1.494$ ,  $p = 0.135$ . On the other hand, 645 (75.4%) respondents were single, while the remaining 210 (24.6%) were married. Regarding household configuration, 444 (51.9%) respondents reported to live at home with children under 12 years old, while 327 (38.2%) lived at home with people 60 years or older.

### Measures

#### Brief Symptom Inventory-53

The Brief Symptom Inventory-53 (BSI-53) is a self-reported questionnaire designed to screen the presence of clinical symptoms, specifically Depression ( $\alpha = 0.892$ ), Anxiety ( $\alpha = 0.849$ ), Phobic Anxiety ( $\alpha = 0.795$ ), Somatization ( $\alpha = 0.876$ ), Interpersonal Sensitivity ( $\alpha = 0.836$ ), Obsessive-Compulsive traits ( $\alpha = 0.900$ ), Hostility ( $\alpha = 0.851$ ), Paranoid Ideation ( $\alpha = 0.799$ ), and Psychoticism ( $\alpha = 0.804$ ). The BSI-53, consist on 53 items, each of them scored in a 5-point Likert scale format (Derogatis, 1993), scores closer to 0 indicate a lower symptomatic prevalence, while scores near 4 indicate a higher prevalence. Other authors report good reliability scores for the BSI-53, with an overall Cronbach's alpha of 0.972 (Mohammad et al., 2019). Previous studies have concluded that the BSI-53 is an objective and precise tool to evaluate the presence of psychopathological symptoms (Ruckenstein and Staab, 2001).

#### Attitudes Toward Seeking Professional Psychological Help Scale-Short Form

The Attitudes Toward Seeking Professional Psychological Help Scale-Short Form (ATSPPH-SF) consists of 10 items with Likert-type responses (Fischer and Farina, 1995). Scores closer to 1 indicate a negative attitude, while scores near 4 indicate a favorable attitude toward seeking professional psychological help

(1 = disagree, 2 = somewhat disagree, 3 = somewhat agree, 4 = agree). The scale has also been validated for a Latino adult population, in which an Exploratory Factor Analysis (EFA) suggested the presence of two different dimensions: Openness to Seeking Treatment ( $\alpha = 0.640$ ; average inter-item  $r = 0.396$ ) and the Perceived Value and Need in Seeking Treatment (VNST) ( $\alpha = 0.756$ ; average inter-item  $r = 0.526$ ). The overall scale had a Cronbach's alpha of 0.758 and an average inter-item  $r$  of 0.461. A Confirmatory Factor Analysis (CFA) based upon the data of the current research validates the two-dimensional nature of the scale proposed by Torres et al. (2020), CFI = 0.972, TLI = 0.963, RMSEA = 0.040.

#### Coronavirus (COVID-19) Awareness Scale

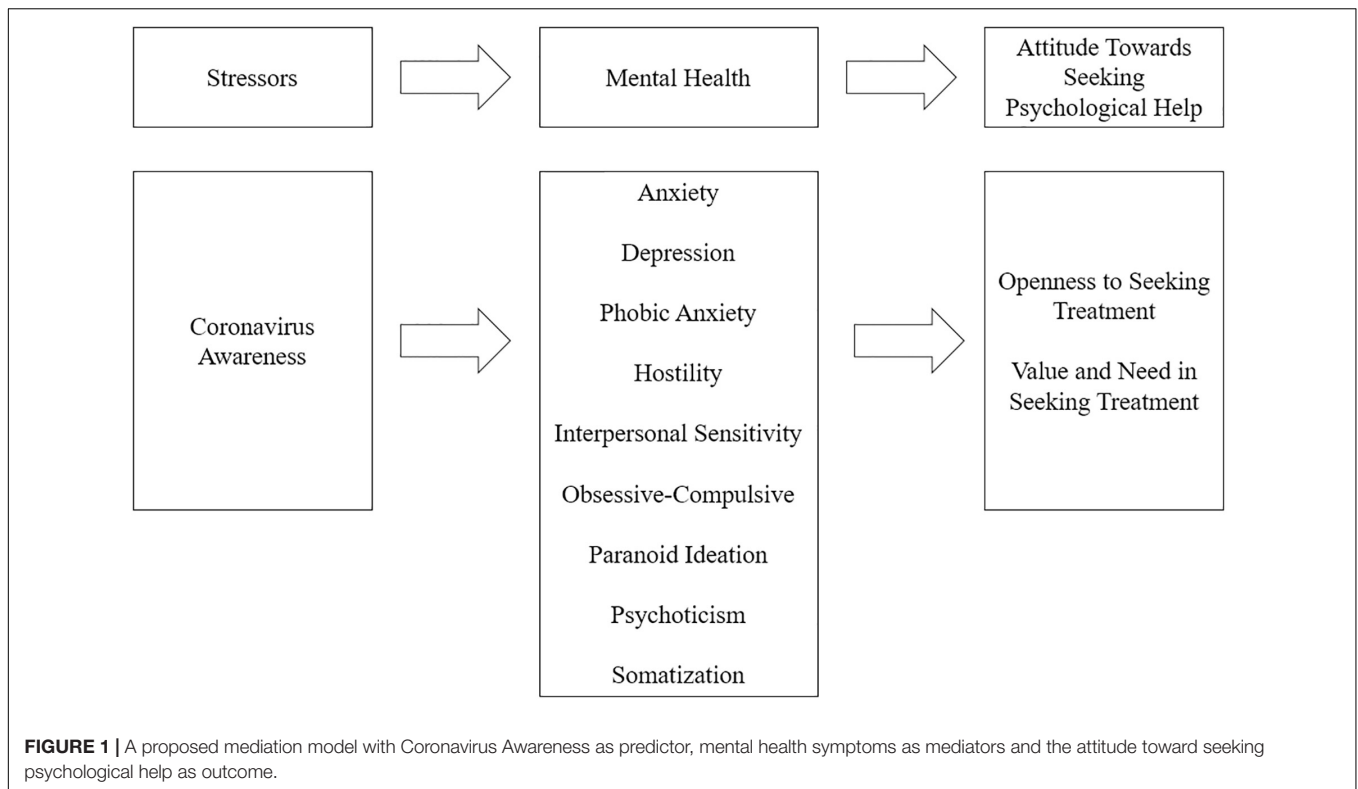
The Coronavirus Awareness Scale-10 (CAS-10) is a 10-item questionnaire built by the authors of the current study, each author individually proposed items, which were later discussed by the research team, the more pertinent and well-structured items were selected to be applied in the selected sample. The CAS-10 has a Likert type response set of 5 points (0–4). An EFA analysis with a maximum likelihood extraction method and an oblimin rotation was executed to detect the underlying factorial structure of the scale. This oblique rotation method allows factors to correlate with each other (Field, 2009), as is the case for many psychological constructs. The Bartlett's Test of Sphericity [ $\chi^2 = 1,917.893$  ( $df = 45$ ),  $p < 0.001$ ] and the KMO Measure of Sampling Adequacy (0.804) have an acceptable performance (see **Table 1**). The three resulting factors are Coronavirus Concern (refers to the preoccupation about getting infected with COVID-19), Exaggerated Perception (the belief that the media and governments are overreacting with the COVID-19 situation) and Immunity Perception (the belief that one is not likely to get infected by COVID-19).

Each factor mean is built by averaging the corresponding items raw scores (without reverse coding). Considering item orientation, a higher Coronavirus Concern score (which only contains positive oriented items) indicates a higher Coronavirus Awareness. While high scores on the Exaggerated Perception and Immunity Perception subscales indicate low Coronavirus Awareness. The CAS-10 has a Cronbach's alpha of 0.762, which is considered acceptable (Coolican, 2004). However, given that this coefficient is affected by the number of items in the scale, average inter-item correlations were also obtained for the overall CAS-10 items (0.436). Specifically, the Coronavirus Concern subscale had the highest Cronbach's alpha score ( $\alpha = 0.715$ ; average inter-item  $r = 0.487$ ), followed by the Exaggerated Perception ( $\alpha = 0.667$ ; average inter-item  $r = 0.436$ ) and Immunity Perception subscales ( $\alpha = 0.550$ ; average inter-item  $r = 0.381$ ). Given that these average inter-item correlations are between the 0.15 and 0.50 limits, the subscales are considered to be adequately consistent (BrckaLorenz et al., 2013), despite the low number of items included.

### Statistical Analysis

Data was analyzed using Jamovi 1.1 (The Jamovi Project, 2019). First, demographic variables were described using relative and absolute frequencies as well as mean scores and standard





**TABLE 1 |** Factor loadings for the CAS-10.

Item	Factor			Uniqueness
	Coronavirus concern	Exaggerated perception	Immunity perception	
C4. I am concerned about the spread of Coronavirus (COVID-19).	<b>0.844</b>	0.016	-0.008	0.293
C2. I am afraid of catching Coronavirus (COVID-19).	<b>0.653</b>	0.063	-0.101	0.549
C10. Coronavirus (COVID-19) is a serious problem.	<b>0.539</b>	-0.210	0.090	0.611
C1. I am constantly informed about the situation of the Coronavirus (COVID-19).	<b>0.431</b>	-0.009	0.031	0.821
C6. I have taken precautions to avoid getting the Coronavirus (COVID-19).	<b>0.406</b>	-0.081	0.063	0.821
C9. I feel like this Coronavirus issue (COVID-19) is more paranoia than anything else.	-0.007	<b>0.861</b>	-0.003	0.256
C8. I believe that quarantine measures to prevent the spread of Coronavirus (COVID-19) are exaggerated.	-0.058	<b>0.533</b>	0.106	0.620
C3. The media exaggerates about the danger of contagion of the Coronavirus (COVID-19).	0.039	<b>0.492</b>	0.020	0.765
C7. I am not worried about getting Coronavirus (COVID-19).	-0.011	0.009	<b>0.989</b>	0.005
C5. I do not think I can get Coronavirus (COVID-19).	0.068	0.248	<b>0.301</b>	0.811

"Maximum likelihood" extraction method was used in combination with an "oblimin" rotation. RMSEA = 0.053; TLI = 0.943, these values are above the threshold values (RMSEA ≤ 0.08 and TLI ≥ 0.90) used in similar studies (Li et al., 2018). Items C3, C5, C7, C8, and C9 have a negative orientation. "Coronavirus Concern" accounts for 18.204% of the variance, "Exaggerated Perception" for 14.717% and "Immunity Perception" for 11.448%, for a total cumulative percentage of 44.369. Significant item loadings (>0.30) are presented in bold letter.

deviations. Items from the CAS-10 and the ATSPPH-SF with negative orientation were inversely recoded and their structural properties determined with EFA and CFA, respectively. The relationships between CAS-10, BSI-53, and age were determined

by Pearson's *r* coefficient. Between-group comparisons for sex were made through a MANOVA test, while comparisons for household configuration were determined through a Student's *t*-test.

Finally, a Mediation Analysis was used to study the relationship between Coronavirus Awareness (predictor), BSI-53 symptoms (mediators) and Attitudes Toward Seeking Professional Psychological Help (outcome). This analysis included Delta method standard errors and bias-corrected percentile bootstrap confidence intervals based on 1,000 replications. Such method provides stable and precise coverage rates and has an overall good performance (Biesanz et al., 2010).

## Ethical Considerations

The current research was made in accordance with the Ethical Guidelines provided by the master's degree in Clinical Psychology of the National Autonomous University of Honduras, which approved the present study. An online informed consent was presented to all potential participants, it included information regarding the purpose of the study, an anonymity statement, potential risks and benefits, the name and e-mail of the main researcher. At the end of the survey participants were presented with a web link which redirected to a free online psychological assistance website supported by the National Autonomous University of Honduras.

## Coronavirus Awareness and Demographic Variables

### General Description of Scores

Most respondents are aware of COVID-19 and its implications. For example, 55.7% of the respondents totally agreed with the item "I am constantly informed about the Coronavirus

situation" and 69.1% completely agreed that COVID-19 is a serious problem. Nonetheless, a considerable number of participants (30.4%) believed that the media makes exaggerated claims about the COVID-19 dangers (see **Table 2**). The overall CAS-10 mean score was of 3.007 ( $SD = 0.651$ ), as for the subscales, higher mean scores correspond to Coronavirus Concern ( $M = 3.356$ ,  $SD = 0.641$ ), followed by Exaggerated Perception ( $M = 1.502$ ,  $SD = 1.072$ ) and Immunity Perception ( $M = 1.105$ ,  $SD = 1.048$ ).

### Coronavirus Awareness and Sex

A MANOVA analysis suggests that there is no statistically significant difference ( $p < 0.05$ ) on the Coronavirus Awareness scores compared to the respondent's sex. In this sense, the Coronavirus Concern scores for men ( $M = 3.320$ ,  $SD = 0.610$ ) do not differ significantly when compared to female respondents ( $M = 3.377$ ,  $SD = 0.657$ ),  $F(1; 673.939) = -1.244$ ,  $p = 0.205$ . Male ( $M = 1.596$ ,  $SD = 1.120$ ) and female subjects ( $M = 1.449$ ,  $SD = 1.042$ ) report no significant difference in the Exaggerated Perception scores,  $F(1; 596.423) = 1.928$ ,  $p = 0.059$ . Similarly, the scores in Immunity Perception do not vary significantly between men ( $M = 1.085$ ,  $SD = 1.025$ ) and women ( $M = 1.116$ ,  $SD = 1.062$ ),  $F(1; 652.178) = -0.417$ ,  $p = 0.674$ .

### Coronavirus Awareness and Household Configuration

Respondents who dwelled with children (12 years or younger) had significantly ( $p < 0.05$ ) higher scores in the Exaggerated Perception and the Immunity Perception subscales than people

**TABLE 2** | Descriptive statistics for each CAS-10 item.

CAS-10 items	Totally disagree n (%)	Disagree n (%)	Neither agree nor disagree n (%)	Agree n (%)	Totally agree n (%)	Mean (SD)
C1. I am constantly informed about the situation of the Coronavirus (COVID-19).	5 (0.60%)	23 (2.7%)	98 (11.5%)	253 (29.6%)	476 (55.7%)	3.371 (0.834)
C2. I am afraid of catching Coronavirus (COVID-19).	64 (7.5%)	70 (8.2%)	133 (15.6%)	190 (22.2%)	398 (46.5%)	2.922 (1.272)
C3. The media exaggerates about the danger of contagion of the Coronavirus (COVID-19).	152 (17.8%)	117 (13.7%)	173 (20.2%)	153 (17.9%)	260 (30.4%)	2.295 (1.469)
C4. I am concerned about the spread of Coronavirus (COVID-19).	15 (1.8%)	12 (1.4%)	79 (9.2%)	194 (22.7%)	555 (64.9%)	3.476 (0.854)
C5. I don't think I can get Coronavirus (COVID-19).	352 (41.2%)	185 (21.6%)	195 (22.8%)	73 (8.5%)	50 (5.8%)	1.163 (1.218)
C6. I have taken precautions to avoid getting the Coronavirus (COVID-19).	11 (1.3%)	19 (2.2%)	52 (6.1%)	236 (27.6%)	537 (62.8%)	3.484 (0.812)
C7. I'm not worried about getting Coronavirus (COVID-19).	432 (50.5%)	154 (18.0%)	139 (16.3%)	57 (6.7%)	73 (8.5%)	1.047 (1.305)
C8. I believe that quarantine measures to prevent the spread of Coronavirus (COVID-19) are exaggerated.	502 (58.7%)	147 (17.2%)	85 (9.9%)	51 (6.0%)	70 (8.2%)	0.877 (1.284)
C9. I feel like this Coronavirus issue (COVID-19) is more paranoia than anything else.	351 (41.1%)	160 (18.7%)	141 (16.5%)	114 (13.3%)	89 (10.4%)	1.333 (1.392)
C10. Coronavirus (COVID-19) is a serious problem.	12 (1.4%)	13 (1.5%)	77 (9.0%)	162 (18.9%)	591 (69.1%)	3.529 (0.831)

The table shows raw scores for negative items (C3, C5, C7, C8, and C9).

whose households did not have children. No such difference was found in the Coronavirus Concern subscale ( $p = 0.896$ ).

Participants who reported that in their household lived people over the age of 60 had a significantly lower Immunity Perception score than subjects that didn't have older adults at home ( $p = 0.010$ ). No statistically significant difference was found for the Coronavirus Concern subscale ( $p = 0.162$ ) nor the Exaggerated Perception subscale ( $p = 0.074$ ). **Table 3** summarizes the descriptive and comparative statistics for the CAS-10 scale regarding household configuration.

### Coronavirus Awareness and Age

Results suggest that there is a significant correlation between the respondent's age and the Coronavirus Awareness subscales. For instance, Coronavirus Concern scores are positively related to the respondent's age ( $r = 0.116$ ,  $p < 0.001$ ); indicating that increases in Coronavirus Concern scores are weakly associated with increases in age and vice versa. There are also weak negative relationships between the Exaggerated Perception and Immunity Perception subscales regarding the respondent's age ( $r = -0.171$ ,  $p < 0.001$ ;  $r = -0.097$ ,  $p = 0.004$ , respectively). It is worth noting that Pearson's  $r$  coefficients for all variables are stronger in men than in women (see **Table 4**).

## Coronavirus Awareness and Mental Health

### Description of BSI-53 Symptoms

The most intense symptoms reported by the respondents correspond to the Obsessive-Compulsive domain ( $M = 1.595$ ,  $SD = 1.054$ ), followed by Anxiety ( $M = 1.592$ ,  $SD = 0.92$ ) and Interpersonal Sensitivity ( $M = 1.46$ ,  $SD = 1.071$ ). The less intense symptoms included: Hostility ( $M = 1.440$ ,  $SD = 1.021$ ), Social Phobia ( $M = 1.435$ ,  $SD = 1.005$ ), Depression ( $M = 1.378$ ,  $SD = 1.035$ ), Paranoid Ideation ( $M = 1.339$ ,  $SD = 0.937$ ),

Psychoticism ( $M = 1.222$ ,  $SD = 0.981$ ), and Somatization ( $M = 1.061$ ,  $SD = 0.897$ ). The Overall BSI-53 score was of 1.391 ( $SD = 0.856$ ).

### Relationship Between Coronavirus Awareness and BSI-53

Significant ( $p < 0.001$ ), although weak, relationships were found between the Coronavirus Concern subscale and symptoms of Anxiety, Depression, Phobic Anxiety and Psychoticism. Additionally, Exaggerated Perception relates significantly to symptoms of Anxiety, Depression, Hostility, Interpersonal Sensitivity, Obsessive-Compulsive scores, Paranoid Ideation, Psychoticism, and Somatization. Immunity Perception scores are significantly correlated with Paranoid Ideation and Psychoticism. Nonetheless, it's worth mentioning that all subscale correlation coefficients have a small effect size ( $r < 0.30$ ) (Cohen, 1992). All correlation coefficients between the CAS-10 and the BSI-53 are presented in **Table 5**.

### Coronavirus Awareness and Attitudes Toward Seeking Professional Psychological Help

Coronavirus Concern scores have a significant ( $p = 0.003$ ) and positive ( $\beta = 0.178$ ) direct effect on Openness to Seeking Psychological Treatment (OSPT). Moreover, the Exaggerated Perception ( $\beta = -0.124$ ,  $p < 0.001$ ) and Immunity Perception scores ( $\beta = -0.104$ ,  $p = 0.003$ ) have significant direct negative effects on the VNST scores (see **Table 6**).

Indirectly, the relationship between Coronavirus Concern and Openness to Seeking Treatment is significantly mediated by Anxiety scores ( $\beta = 0.060$ ,  $p = 0.006$ ). Similar results were found for the VNST subscale ( $\beta = 0.036$ ,  $p = 0.007$ ). On the other hand, there is a negative significant effect of Immunity Perception over Openness to Seeking Treatment mediated by Paranoid Ideation ( $\beta = -0.040$ ,  $p = 0.005$ ) (see **Table 7**). Overall, Immunity Perception had a negative and significant total indirect effect on Openness to Seeking Treatment ( $\beta = -0.029$ ,  $p = 0.005$ ) (see **Table 8**).

Coronavirus Concern had a significant positive total effect on Openness to Seeking Treatment ( $\beta = 0.193$ ,  $p < 0.001$ ), while both Exaggerated Perception ( $\beta = -0.153$ ,  $p < 0.01$ ) and Immunity Perception ( $\beta = -0.109$ ,  $p = 0.002$ ), had significant negative total effects on the VNST scores (see **Table 9**). However, the overall model only achieved an  $r^2$  of 0.060 for the OSPT and an  $r^2$  of 0.095 for the VNST scores.

**TABLE 3** | Descriptive and comparative statistics for CAS-10 scores according to household configuration.

Scale	Group	Mean	SD	F	df 1; df 2	p
<b>Presence of children at home (&lt;12 years)</b>						
Coronavirus concern	No	3.353	0.615	0.017	1; 853.00	0.896
	Yes	3.359	0.664			
Exaggerated perception	No	1.422	1.094	4.410	1; 840.615	0.036
	Yes	1.576	1.047			
Immunity perception	No	1.021	1.026	5.121	1; 851.552	0.024
	Yes	1.182	1.064			
<b>Presence of older adults at home (&gt;60 years)</b>						
Coronavirus concern	No	3.332	0.643	1.962	1; 697.628	0.162
	Yes	3.395	0.635			
Exaggerated perception	No	1.553	1.079	3.196	1; 701.942	0.074
	Yes	1.419	1.057			
Immunity perception	No	1.176	1.076	6.702	1; 732.372	0.010
	Yes	0.989	0.993			

From the total sample size, 444 respondents report the presence of minors (<12 years) at home, while 411 do not. On the other hand, 528 report to live with older adults (>60 years) and 327 do not.

**TABLE 4** | Relationship between CAS-10 subscales and age, compared by the respondent's sex.

Scale	Statistics	General age	Men's age	Women's age
Coronavirus concern	$r$	0.116***	0.152**	0.096*
	$p$ -value	< 0.001	0.008	0.024
Exaggerated perception	$r$	-0.171***	-0.225***	-0.136**
	$p$ -value	< 0.001	< 0.001	0.001
Immunity perception	$r$	-0.097**	-0.236***	-0.028
	$p$ -value	0.004	< 0.01	0.509

Pearson's  $r$  coefficient was used to correlate the variables. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**TABLE 5** | Correlation between CAS-10 and BSI-53 subscales.

Scale	Statistic	Coronavirus concern	Exaggerated perception	Immunity perception
Anxiety	<i>r</i>	0.111**	0.074*	-0.033
	<i>p</i> -value	0.001	0.030	0.332
Depression	<i>r</i>	-0.088**	0.165***	0.038
	<i>p</i> -value	0.01	< 0.001	0.269
Phobic anxiety	<i>r</i>	0.131***	0.021	-0.06
	<i>p</i> -value	< 0.001	0.546	0.081
Hostility	<i>r</i>	-0.030	0.162***	0.045
	<i>p</i> -value	0.383	< 0.001	0.186
Interpersonal sensitivity	<i>r</i>	-0.060	0.131***	0.049
	<i>p</i> -value	0.079	< 0.001	0.155
Obsessive-compulsive	<i>r</i>	-0.025	0.134***	0.028
	<i>p</i> -value	0.463	< 0.001	0.413
Paranoid ideation	<i>r</i>	-0.008	0.202***	0.077*
	<i>p</i> -value	0.820	< 0.001	0.024
Psychoticism	<i>r</i>	-0.137***	0.201***	0.097**
	<i>p</i> -value	< 0.001	< 0.001	0.004
Somatization	<i>r</i>	-0.024	0.13***	0.022
	<i>p</i> -value	0.487	< 0.001	0.525
Overall BSI-53 score	<i>r</i>	-0.019	0.157***	0.034
	<i>p</i> -value	0.588	< 0.001	0.317

The BSI-53 subscales measure the prevalence of symptoms, but do not constitute a clinical diagnosis. Pearson's *r* coefficient was used to correlate the variables. \**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001.

## DISCUSSION

Our study concluded that individuals who live with older adults (age > 60) had significantly lower Immunity Perception scores than subjects that do not. Complementarily, respondents who live with children (age < 12) tend to endorse the Immunity Perception and the belief that COVID-19 situation is being exaggerated; such beliefs may detonate risky health behaviors in such populations. Results showed that increases in Coronavirus Concern scores are associated with increases in age and vice-versa. This could be related to the fact that older age is considered a risk factor for ARDS and death (Rothan and Byrareddy, 2020). On the other side, younger age has been related to mild disease

and better health outcomes (Verity et al., 2020). That is not to say that young people are immune to the virus, therefore, adolescents and young people should receive information about COVID-19. This can be achieved through digital platforms that promote age-friendly content (United Nations Population Fund, 2020).

The most intense symptoms reported by respondents were related to the obsessive-compulsive domain, followed by anxiety and interpersonal sensitivity. These findings are consistent with other studies that reported that individuals exposed to information related to outbreaks experienced higher anxiety symptoms related to health and obsessive-compulsive behavior (Brand et al., 2013). Congruently, our study found a significant positive, although weak, correlation between Coronavirus Concern, anxiety and social phobia. Given the epidemiologic nature of COVID-19, prevention strategies are partly based on social distancing, implying that people should be at least a meter apart from each other (World Health Organization, 2020a). In this sense, many countries around the world recommend their citizens to avoid public spaces (Public Health Ontario, 2020), therefore an increase in social phobia indicators is a natural response to such circumstances.

Another of our findings determined a small negative relationship between the presence of depression symptoms and Coronavirus Awareness. To understand this, the reader must consider that apathy is a common characteristic of depressive disorders (American Psychiatric Association, 2013). In certain populations, respondents with higher depression scores may be less concerned about health issues, indicating a higher level of self-neglect (Hansen et al., 2017). However, these results should be considered with caution as the BSI-53 only screens for symptoms of depression and does not constitute a clinical diagnosis.

Hostility and interpersonal sensitivity symptoms are positively related to the belief that the COVID-19 impact and responses are being exaggerated. Previous research suggests that these traits are highly associated with passive coping strategies (Mao et al., 2003), however, more research is still needed to clearly understand this dynamic. Another symptom of interest corresponds to the paranoid ideation domain, which correlates positively with both the Exaggerated Perception and the Immunity Perception subscales. Respondents with higher paranoid ideation and psychoticism could distrust public media and the government position regarding the impact of COVID-19 in society, minimizing its repercussions. In this sense, prior

**TABLE 6** | Direct effects of CAS-10 subscales over ATSPPH-SF subscales.

Predictor	Outcome	Estimate	Std. error	z-value	<i>p</i>	Lower 95% CI	Upper 95% CI
Coronavirus concern	Openness to seeking treatment	0.178	0.060	2.974	<b>0.003</b>	<b>0.039</b>	0.315
Exaggerated perception		-0.008	0.036	-0.224	0.823	-0.078	0.068
Immunity perception		-0.062	0.036	-1.744	0.081	-0.140	0.012
Coronavirus concern	Value and need in seeking treatment	0.033	0.059	0.569	0.569	-0.097	0.159
Exaggerated perception		-0.124	0.036	-3.451	<b>&lt;0.001</b>	-0.205	-0.053
Immunity perception		-0.104	0.035	-2.964	<b>0.003</b>	-0.181	-0.029

Delta method standard errors, bias-corrected percentile bootstrap confidence intervals based on 1,000 replications, ML estimator. Significant estimates (*p* < 0.05) are in boldface.



**TABLE 7 |** Indirect effects of CAS-10 subscales on ATSPPH-SF subscales.

Predictors	Mediators	Outcomes	Estimate	Std. error	z-value	p	Lower 95% CI	Upper 95% CI	
Coronavirus concern	Anxiety	Openness to seeking treatment	0.060	0.022	2.737	<b>0.006</b>	0.022	0.116	
	Depression		0.002	0.005	0.451	0.652	-0.005	0.032	
	Phobic anxiety		-0.021	0.013	-1.604	0.109	-0.061	0.002	
	Hostility		-0.004	0.005	-0.694	0.488	-0.028	0.004	
	Interpersonal sensitivity		0.001	0.003	0.375	0.707	-0.005	0.021	
	Obsessive-compulsive		0.005	0.009	0.576	0.564	-0.008	0.037	
	Paranoid ideation		-0.016	0.010	-1.534	0.125	-0.049	-0.001	
	Psychoticism		-0.009	0.009	-0.903	0.366	-0.041	0.003	
	Somatization	-0.003	0.006	-0.535	0.593	-0.026	0.008		
	Exaggerated perception	Anxiety	Value and need in seeking treatment	0.036	0.013	2.677	<b>0.007</b>	0.012	0.072
		Depression		-0.006	0.012	-0.492	0.623	-0.036	0.018
		Phobic anxiety		-0.008	0.006	-1.437	0.151	-0.028	0.001
		Hostility		-0.014	0.011	-1.299	0.194	-0.04	0.007
		Interpersonal sensitivity		-0.006	0.008	-0.739	0.460	-0.027	0.009
		Obsessive-compulsive		0.021	0.011	1.870	0.061	0.002	0.050
		Paranoid ideation		-0.028	0.014	-2.096	<b>0.036</b>	-0.060	-0.002
Psychoticism		0.012		0.012	0.985	0.325	-0.009	0.043	
Somatization		-0.015	0.009	-1.659	0.097	-0.038	-0.001		
Immunity perception		Anxiety	Openness to seeking treatment	-0.012	0.01	-1.244	0.214	-0.042	0.005
		Depression		0.002	0.004	0.459	0.646	-0.005	0.021
		Phobic anxiety		0.005	0.004	1.108	0.268	-0.001	0.022
		Hostility		0.002	0.003	0.545	0.586	-0.004	0.017
		Interpersonal sensitivity		0.001	0.002	0.253	0.801	-0.005	0.009
		Obsessive-compulsive		-0.004	0.006	-0.742	0.458	-0.023	0.006
		Paranoid ideation		-0.001	0.005	-0.098	0.922	-0.014	0.010
	Psychoticism	0.001		0.003	0.044	0.965	-0.007	0.012	
	Somatization	0.004	0.004	0.849	0.396	-0.003	0.018		
	Immunity perception	Anxiety	Value and need in seeking treatment	0.026	0.017	1.534	0.125	-0.002	0.071
		Depression		-0.002	0.005	-0.478	0.632	-0.029	0.007
		Phobic anxiety		-0.005	0.012	-0.424	0.672	-0.033	0.022
		Hostility		0.001	0.003	0.233	0.815	-0.006	0.017
		Interpersonal sensitivity		0.003	0.008	0.423	0.673	-0.01	0.025
		Obsessive-compulsive		-0.001	0.002	-0.027	0.978	-0.013	0.010
		Paranoid ideation		-0.022	0.013	-1.761	0.078	-0.061	-0.002
Psychoticism		-0.004		0.009	-0.45	0.653	-0.032	0.009	
Somatization		-0.001	0.002	-0.198	0.843	-0.014	0.006		
Immunity perception		Anxiety	Openness to seeking treatment	0.016	0.01	1.523	0.128	-0.002	0.044
		Depression		0.006	0.012	0.529	0.597	-0.019	0.039
		Phobic anxiety		-0.002	0.005	-0.42	0.674	-0.015	0.009
		Hostility		0.002	0.010	0.243	0.808	-0.017	0.025
		Interpersonal sensitivity		-0.015	0.009	-1.724	0.085	-0.043	-0.001
		Obsessive-compulsive		-0.001	0.010	-0.027	0.978	-0.024	0.023
		Paranoid ideation		-0.040	0.014	-2.827	<b>0.005</b>	-0.072	-0.013
	Psychoticism	0.005		0.012	0.459	0.646	-0.015	0.032	
	Somatization	-0.002	0.008	-0.211	0.833	-0.018	0.016		
	Immunity perception	Anxiety	Value and need in seeking treatment	-0.005	0.005	-1.032	0.302	-0.028	0.002
		Depression		-0.002	0.004	-0.489	0.625	-0.018	0.005
		Phobic anxiety		0.001	0.003	0.408	0.683	-0.005	0.011
		Hostility		-0.001	0.001	-0.226	0.821	-0.009	0.004
		Interpersonal sensitivity		0.001	0.005	0.266	0.791	-0.009	0.015
		Obsessive-compulsive		0.001	0.002	0.027	0.978	-0.007	0.010
		Paranoid ideation		-0.001	0.007	-0.098	0.922	-0.018	0.013
Psychoticism		0.001		0.001	0.043	0.965	-0.006	0.010	
Somatization		0.001	0.002	0.206	0.837	-0.005	0.010		

The BSI-53 subscales measure the prevalence of symptoms, but do not constitute a clinical diagnosis. Delta method standard errors, bias-corrected percentile bootstrap confidence intervals based on 1,000 replications, ML estimator. Significant estimates ( $p < 0.05$ ) are in boldface.

**TABLE 8** | Total indirect effects of CAS-10 subscales on ATSPPH-SF subscales.

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower 95% CI	Upper 95% CI
Coronavirus concern	Openness to seeking treatment	0.015	0.022	0.693	0.488	-0.03	0.06
	Value and need in seeking treatment	-0.009	0.010	-0.831	0.406	-0.035	0.013
Exaggerated perception	Openness to seeking treatment	-0.004	0.008	-0.582	0.561	-0.023	0.015
	Value and need in seeking treatment	-0.004	0.022	-0.184	0.854	-0.056	0.040
Immunity perception	Openness to seeking treatment	-0.029	0.010	-2.813	<b>0.005</b>	-0.054	-0.008
	Value and need in seeking treatment	-0.005	0.008	-0.66	0.509	-0.024	0.012

Delta method standard errors, bias-corrected percentile bootstrap confidence intervals based on 1,000 replications, ML estimator. Significant estimates ( $p < 0.05$ ) are in boldface.

**TABLE 9** | Total effects of CAS-10 subscales on ATSPPH-SF subscales.

Predictor	Outcome	Estimate	Std. Error	z-value	p	Lower 95% CI	Upper 95% CI
Coronavirus concern	Openness to seeking treatment	0.193	0.057	3.366	<b>&lt;0.001</b>	0.054	0.325
Exaggerated perception		-0.017	0.036	-0.463	0.643	-0.093	0.054
Immunity perception		-0.067	0.036	-1.849	0.064	-0.145	0.009
Coronavirus concern	Value and need in seeking treatment	0.029	0.056	0.519	0.604	-0.108	0.151
Exaggerated perception		-0.153	0.036	-4.292	<b>&lt;0.001</b>	-0.231	-0.079
Immunity perception		-0.109	0.036	-3.072	<b>0.002</b>	-0.185	-0.032

Delta method standard errors, bias-corrected percentile bootstrap confidence intervals based on 1,000 replications, ML estimator. Significant estimates ( $p < 0.05$ ) are in boldface.

research has determined a link between paranoid ideation, distrust (Kirk et al., 2013), and the endorsing of conspiracy theories (Darwin et al., 2011).

A similar trend has been suggested for psychoticism and its relationship to medical mistrust and conspiracy theories during pandemic outbreaks (Moukaddam and Shah, 2020), this could help understand the positive relationship between COVID-19 Exaggerated Perception subscale and psychotic symptoms. Although there is a clear relationship between stress exposure and psychotic symptoms (Van Winkel et al., 2008), our research found a negative and weak relationship between Coronavirus Concern and psychoticism. This lack of concern may be explained by the positive correlation of psychoticism with Exaggerated Perception and Immunity Perception. Therefore, respondents who score higher on psychotic symptoms are also less preoccupied with the COVID-19 situation and are more likely to believe that the media exaggerates this situation and that they are not likely to get infected with COVID-19.

This study revealed that most individuals are constantly informing themselves about the COVID-19 current situation and they believe it is a serious problem. However, there is a significant number of respondents that believe the media is exaggerating the situation. Such set of beliefs clearly poses contagion risks that should be addressed by local governments. This could be achieved by promoting health literacy and epidemic prevention strategies (Wang and Wang, 2020), by constantly informing the public about the prevalence and incidence of COVID-19 cases and implementing campaigns designed to educate citizens regarding self-protection measures (Hu et al., 2020).

A relevant finding was that Coronavirus Concern had a positive and direct effect on OSPT, this relationship was significantly mediated by anxiety scores. This is consistent with a study that reported that people who experience anxiety

symptoms have, more often, a better attitude toward seeking psychological help (Roness et al., 2005). This could be related to the fact that anxiety symptoms can quickly progress and become harder to manage by oneself in comparison to other disorders. Immunity Perception had a negative effect on OSPT. In this sense, previous research has found that the presence of subjective needs is positively related to attitudes toward seeking psychological help (Nagai, 2015). Translated to our study, this can signify that respondents with high Immunity Perception scores do not feel the need to seek psychological attention. However, given the small determinant coefficients of the results, other variables besides the presence of psychological symptoms should be considered to understand people's attitudes toward seeking professional psychological help (Nunes Baptista and Zanon, 2017).

Health care systems should take into consideration that the COVID-19 crisis may exacerbate symptoms related to anxiety, depression, and obsessive-compulsive behavior. A way to mitigate this situation could be to provide professional psychological help through the use of online resources, such as they did in China in different stages of the pandemic. In this sense, two simultaneous activities during crisis intervention may be considered: (1) mitigate the fear of the disease and, (2) help coping with difficulties in the adaptation process (Zhang et al., 2020). Since the current pandemic is affecting mental health, the Honduran health care system should take technology as an advantage to reach patients that are experiencing these negative symptoms. Given our results, such response system should focus on interventions designed to mitigate anxiety symptoms. In this sense, recent studies have found that the use of mobile-phone applications based on coach-supported platforms are effective in treating symptoms of anxiety (Graham et al., 2020).

The current research did not take into consideration the potential effects of social distancing and quarantine measures that may impact mental health; more research is yet needed in this subject. Future studies should also focus on specific groups that, given the nature of their work, are in constant risk of infection. Frontline workers (like health care professionals and police force members) have more probabilities of experiencing stressors related to stigmatization, biosecurity procedures, an increased workload and the fear of transmitting COVID-19 to others. Additional variables such as lifestyle and physical activity should also be considered in future studies (Zhou et al., 2020). A mixed-methods approach may provide a more profound comprehension of this phenomenon.

The cross-sectional nature of the current study, which focused on the initial stages of the COVID-19 pandemic, only gives a limited glimpse of the relationship between pandemic outbreaks and mental health indicators of the affected populations. More longitudinal data is still needed on the subject to better determine the causal relationships between variables. Data collection for this research was made between the 16th and the 23rd of March, during this time Honduras reported 30 confirmed COVID-19 cases with 0 fatalities. However, as of May 27th, 2020, the country reported 4,401 confirmed cases and 188 deaths (Honduras Health Secretary, 2020), this increase in COVID-19 cases, in addition to the effects of social confinement and the restriction of liberties, are not accounted for in our research. Another limitation of our study is the non-probabilistic sampling method that was used, which may restrict the inferential capability of our results. Future studies should also explore alternative data analysis, such as non-parametric and Bayesian approaches to further corroborate the results presented in the current research.

The proposed mediation model stated an unidirectional influence of Coronavirus Awareness, mental health indicators and attitudes toward seeking psychological help. However, this relationship could be bidirectional. In this sense, COVID-19 awareness may influence the prevalence of psychopathological indicators. But, such indicators may also have an impact on Coronavirus Awareness itself (as was discussed regarding depression and paranoid ideation symptoms). Further studies

are still needed to clarify this dynamic. On the other hand, the BSI-53 measures the prevalence and intensity of different psychological symptoms, but it does not constitute a clinical diagnosis. Finally, given that the current research had a limited psychopathological-based approach to mental health, future studies should include positive and protective variables like resilience, subjective well-being, among other factors that respond to a more holistic, humanistic, and positive concept of mental health.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

ML-B and AL-B were responsible for the questionnaire design, data collection, and statistical analysis. CM-M and CM-S were responsible for building the theoretical and contextual framework of the study, as well as data interpretation. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Mental Health During the First Weeks of the COVID-19 Pandemic in the United States

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**Background:** By March 2020, the World Health Organization declared the COVID-19 crisis as a worldwide pandemic and many local governments instituted stay-at-home orders and closed non-essential businesses. Within the United States, tens of millions of workers lost their jobs and financial security during the first few weeks of the national response, in an attempt to slow the global pandemic. Because of the enormity of the pandemic and its potential impact on mental health, the objective of the present study was to document the prevalence of mental health problems and their association with pandemic-related job loss during the third week of the nationwide shutdown.

**Methods:** Mental health was assessed via online questionnaires among a representative sample of 1,013 U.S. adults on April 9–10, 2020. Rates of clinically significant mental health outcomes were compared between participants who lost their job as a result of COVID-19 restrictions (17.4%) vs. those who did not (82.6%). Bivariate multiple logistic regression identified factors that were predictive of, and protective against, mental health problems.

**Results:** The prevalence of clinically significant symptoms was significantly higher than prior population estimates, ranging from 27 to 32% for depression, 30 to 46% for anxiety disorders, 15 to 18% for acute/post-traumatic stress, 25% for insomnia, and 18% for suicidal ideation. Prevalence estimates were 1.5–1.7 times higher for those who reported job loss due to COVID-19 restrictions than those who did not. Mental health problems were predicted by worry over financial instability, insomnia, social isolation, and alcohol consumption, while getting outside more often, perceived social support, and older age were protective against these problems.

**Conclusions:** During the first 3 weeks of lockdowns/stay-at-home restrictions, mental health problems, including depression, anxiety, insomnia, and acute stress reactions were notably elevated relative to prior population estimates. Job loss related to the nationwide shutdown was particularly associated with poorer mental health. These findings provide a baseline of mental health functioning during the first weeks of the national emergency and lockdown orders in response to COVID-19.

**Keywords:** COVID-19, depression, generalized anxiety, PTSD, insomnia, mental health, job loss, financial worries

## INTRODUCTION

During the first weeks of the COVID-19 pandemic, nations around the globe implemented unprecedented measures to mitigate the transmission of the SARS CoV-2 virus (1, 2). The United States reported the first COVID-19-related death on February 29, 2020, and <2 weeks later, a national state of emergency was called. In response, local and state governments closed schools, shut down all non-essential business, and enacted shelter-in-place orders, with the first state-wide shutdown occurring in California on March 19, 2020. Within a matter of weeks, every state in the country had enacted some form of restriction (3), with most of the U.S. population asked to remain at home and to severely limit physical proximity to others. As a consequence, most employment activities deemed “non-essential” by local governments had ceased or rapidly shifted to remote telecommuting or work-from-home options. This soon led to large scale furloughs and job losses for a large segment of the population (4). Despite the clear public health necessity of the stay-at-home orders and physical distancing strategies to slow the spread of the virus, there is no question that these efforts profoundly altered the basic foundations of the social and occupational lives of much of the population. Consequently, the potential long-term effects of the pandemic and associated restrictions on mental health will likely be a focus of research for years to come.

The financial consequences of the shelter-in-place mitigation strategies were rapidly felt throughout the country. Within the first 6 weeks of state-wide stay-at-home orders in the U.S., more than 33 million Americans had filed new unemployment claims, a level of job loss that had not been seen since the Great Depression (4). This extraordinary surge in unemployment was troubling in light of the well-established findings that that job loss, financial stresses, and lack of social support are leading contributors to suicide, substance abuse, domestic violence, and other mental health issues (5, 6). The rampant uncertainty surrounding the potential course of the pandemic and widespread concerns over financial instability stemming from the lockdown orders led to rising concerns that a surge in mental health problems may be looming on the horizon (7, 8). Fear of the virus, its transmissibility, and its potential lethality contributed to panic and generalized anxiety (9), and raised concerns that post-traumatic stress symptoms could persist long after the pandemic had resolved (10), as has been seen in other countries (11). Quarantines enacted in prior disease outbreaks have also been shown to significantly elevate symptoms of PTSD and depression among the population (12). Moreover, prolonged stay-at-home requirements and social distancing measures may have unintended mental health consequences, as they restrict many of the facets of daily existence that provide emotional resilience, social connection, and satisfaction with life (13). The enormity of the pandemic and its effects on daily existence led many experts to voice concern that that mental health problems may be a lingering issue for years to come (7, 14).

Effective recovery from the pandemic will require a well-documented and comprehensive understanding of the mental health effects that emerged during the acute stages of the crisis.

To that end, we studied the point prevalence of mental health problems in a nationally representative sample of adults in the U.S. collected at the very outset of the pandemic, during the third week of the nationwide stay-at-home restrictions. We identified overall rates of mental health concerns in this sample and determined the differences in mental health outcomes between those who had lost their primary employment due to the economic shutdown and those who had not. We believe that these data will be critical for documenting the mental health status of the population during the initial phase of the COVID-19 pandemic and will serve as a benchmark for future research on the long-term psychiatric outcomes of the crisis.

## METHODS

### Participants

Here, we summarize mental health data from an online assessment collected over a 28-h period between April 9 and April 10, 2020. This date was selected because it was, at that time, projected to be the peak of expected U.S. deaths due to COVID-19 according to the University of Washington Institute for Health Metrics and Evaluation (IHME; <https://covid19.healthdata.org/united-states-of-america>) model during the preceding week. Using the Amazon Mechanical Turk (MTurk) online crowdsourcing platform (15), a total of 1,074 participants were screened and provided small financial compensation for their time. All participants were geographically located within the United States (verified by IP address geo-coordinates), were at least 18 years of age, and reported English as their primary language. A brief screen for reading comprehension excluded 48 volunteers from further participation. The remaining 1,026 individuals then completed the online questionnaires. Data from 13 participants were excluded for failing to correctly answer imbedded attention check questions. This resulted in a final sample of 1,013 participants with complete and valid data, which formed the basis of the present analysis. The sampling of participants from each state was closely proportional to state population according to the 2019 U.S. Census, suggesting a nationally representative sample of U.S. adults. Specifically, we calculated the proportion of participants from each state, relative to the national population total for the sample and for the U.S. Census data for each state. The mean absolute difference in sampling proportions and census data proportions across states was 0.004 (i.e., <0.5% point). Further, we found that all sampled state proportions differed from the census data by 1.5% points or less, except for Texas (which was underrepresented in the current sample by 3% points). The intraclass correlation coefficient (ICC) between the sample proportions and the census data across states was quite high (ICC = 0.95,  $p < 0.0001$ ), suggesting that these data are likely representative of the larger population. All participants provided electronic acknowledgment of informed consent after being provided with a full description of the study. This study was approved by the institutional review board of the University of Arizona.

## Questionnaires and Primary Outcomes

Our goal was to provide a source of reliable documentation of the initial mental health prevalence estimates during the first weeks of the pandemic response, which would provide a benchmark for future research efforts. In an effort to be comprehensive, we included several outcome metrics that assessed similar constructs (e.g., we collected two measures of depressive mood, one longer and more extensive, and another as a brief screener). Outcomes were focused on major mental health symptoms that could potentially result from concerns surrounding the COVID-19 pandemic and/or societal attempts to mitigate the spread of the illness. These included current symptoms (i.e., present within the past week to month) of a major depressive disorder, generalized anxiety disorder (GAD), and acute/post-traumatic stress disorder. Using established instruments, we calculated mean scores and the percentage of the sample exceeding published cut-off scores. Depressive symptoms were assessed with the Beck Depression Inventory-II ( $\geq 20$ ) (16) and the Patient Health Questionnaire-9 ( $\geq 10$ ) (17). We also examined separately the suicidal ideation scores on each of these depression scales (i.e., Item 9 scores  $\geq 1$ ). Generalized anxiety disorder (GAD) symptoms were measured with the GAD-7 ( $\geq 8$ ) (18, 19), the Zung Self-Rated Anxiety Scale (SRAS;  $\geq 36$ ) (20, 21), and the state and trait portions of the Spielberger State-Trait Anxiety Inventory (STAI;  $\geq 46$ ) (22, 23). To assess acute/post-traumatic stress, we administered the National Stressful Events Survey Acute Stress Disorder Short Scale (NSESSS;  $\geq 2$ ) (24, 25), and the Primary Care Post-Traumatic Stress Disorder (PC-PTSD) scale ( $\geq 3$ ) (26, 27). We also measured the severity of insomnia symptoms using the Insomnia Severity Index (ISI;  $\geq 15$ ) (28, 29). To examine potential moderators of the mental health outcomes described above, we also collected data on a variety of demographic factors, particularly related to job loss from the shutdown and socioeconomic status, and specific concerns relevant to the ongoing COVID-19 pandemic. These variables are detailed in **Table 1**.

## Statistical Analysis

We proposed an initial sample size of 1,000 participants, which would provide 88% power to detect effects of interest at a two-sided significance criterion of  $\alpha = 0.05$ , assuming small effect sizes. The data were analyzed using SPSS software (version 26). Means and descriptive statistics were calculated for the sample as a whole, as well as for subgroups of individuals who reported job loss as a result of the societal responses aimed at mitigating the spread of COVID-19. Mean values between job status groups were compared with analysis of covariance (ANCOVA) statistically controlling for pre-pandemic income level, education level, and potential exposure to COVID-19 (i.e., “have you noticed that you are shown symptoms of COVID-19?” and “has anyone in your household been diagnosed with COVID-19?”). For clinically relevant scales where published cut-off points were available, we calculated the percentage of the sample and subgroups that met or exceeded those values. Chi-squared statistics were calculated to compare the percentage of individuals exceeding the cut-offs in each group. Finally, binomial multiple logistic regression analyses, with forward

selection using the Likelihood Ratio, were used to identify key concerns, traits, and behavioral factors associated with meeting criteria for a probable mental health issue. Multiple comparisons were controlled by false discovery rate (FDR) adjustment of significance, which was calculated using the Benjamini-Hochberg procedure, as implemented via the online FDR (tool: <https://tools.carboaction.com/FDR>). The corrections were applied uniformly for all comparisons within each table.

## RESULTS

### Demographics

Primary demographic characteristics of the sample were well-matched to the larger U.S. population (see Methods section). While an upper restriction on age was not set, those who responded to the survey included adults ranging in age from 18 to 82 years and females were slightly over-represented (i.e., 56.4%). Overall, 65.9% of the sample reported a previous year household income of \$75,000 or less.

### Overall Mental Health Outcomes

For the sample as a whole, the proportions of individuals screening positive for probable mental health problems was notably higher than would be expected in a similar sample based on prior research (30, 31). For those screening positive for moderate to severe depression (**Figure 1**, **Table 2**), the prevalence ranged from 27.2% (BDI-II) to 32.2% (PHQ-9). Across four different scales commonly used to screen for GAD and other clinically significant anxiety disorders, the screen-positive prevalence ranged from 29.8% (STAI-State) to 45.8% (SRAS). Further, 15.2% of the sample screened positive for probable Acute Stress Disorder (NSESSS), while 17.9% screened positive on a brief measure of possible PTSD symptoms (PC-PTSD). Critically, 17.6% of the sample screened positive for some evidence of suicidal ideation on two different scales (BDI-II Item 9; PHQ-9 Item 9), while 25.1% of the sample screened positive for clinically significant insomnia on the ISI.

### COVID-19 Job Loss and Mental Health Outcomes

When asked the question “Have you lost your primary job/income due to COVID-19?”, 17.4% of the respondents answered “yes,” while 82.6% answered “no.” As evident in **Table 2**, individuals who lost their job due to COVID-19 scored significantly higher on measures of depression (BDI-II and PHQ-9). Moreover, 38.1% of those who reported job loss due to COVID-19 exceeded the cut-off for moderate to severe depression on the BDI-II, whereas 25.2% of those who had not lost their job met that criterion. This was even more notable for the PHQ-9, with 44.3% of those who lost their job scoring in the clinically significant range, compared to 29.6% who did not. These differences were significant even after controlling for pre-pandemic income level, education, and the perception of close exposure to COVID-19.

Similar patterns were observed for measures of GAD and other anxiety disorders. Most notably, 57.4% of those who lost their job during the pandemic met the cut-off for a probable



**TABLE 1 |** Demographic characteristics and COVID-19 concerns of groups of individuals who lost or did not lose their primary employment due to the pandemic.

Characteristics	Total sample (N = 1,013)	COVID-19 job loss (N = 176)	No job loss (N = 837)	p-Value
*Age—yr	36.74 ± 12.09	34.80 ± 10.43	37.14 ± 12.38	0.009
*Female sex—no. (%)	567 (56.4)	110 (62.9)	457 (55.0)	n.s.
*Education—yr	15.0 ± 2.1	14.6 ± 2.0	15.1 ± 2.1	0.004 <sup>†</sup>
*Ethnicity—no. (%)				n.s.
White	776 (76.6)	139 (79.0)	637 (76.1)	
Black/African American	99 (9.8)	19 (10.8)	80 (9.6)	
Hispanic/Latino	43 (4.2)	5 (2.8)	38 (4.5)	
Asian	66 (6.5)	8 (4.5)	58 (6.9)	
Native American/American Indian/Alaska Native	5 (0.5)	1 (0.6)	4 (0.5)	
Native Hawaiian/Pacific Islander	1 (0.1)	0 (0.0)	1 (0.1)	
Other	21 (2.1)	4 (2.3)	17 (2.0)	
Prefer not to answer	2 (0.2)	0 (0.0)	2 (0.2)	
*Income—no. (%)				0.013
≤\$10,000	50 (4.9)	10 (5.7)	40 (4.8)	
\$10,001–\$25,000	112 (11.1)	30 (17.1)	82 (9.8)	
\$25,001–\$50,000	267 (26.4)	53 (30.3)	214 (25.6)	
\$50,001–\$75,000	238 (23.5)	35 (20.0)	203 (24.3)	
\$75,001–\$100,000	172 (17.0)	31 (17.7)	141 (16.8)	
\$100,001–\$150,000	122 (12.1)	11 (6.3)	111 (13.3)	
\$150,001–\$200,000	34 (3.4)	4 (2.3)	30 (3.6)	
≥\$200,001	17 (1.7)	1 (0.6)	16 (1.9)	
*COVID-19 related concerns—no. reporting YES (%)				
*Have you noticed that you are showing symptoms of COVID-19 (fever, dry cough, fatigue/soreness)?	113 (11.2)	29 (16.5)	84 (10.0)	0.014 <sup>†</sup>
*Have you been tested for COVID-19?	31 (3.1)	8 (4.5)	23 (2.7)	n.s.
*Have you been formally diagnosed with COVID-19?	4 (0.4)	2 (1.1)	2 (0.2)	n.s.
*Are you considered to be in a “high-risk” group for COVID-19?	309 (30.5)	57 (32.4)	252 (30.1)	n.s.
*Has anyone in your household (i.e., where you live) been diagnosed with COVID-19?	16 (1.6)	7 (4.0)	9 (1.1)	0.005 <sup>†</sup>
*Have any of your friends, co-workers, or first-degree relatives been diagnosed with COVID-19?	203 (20.0)	47 (26.7)	156 (18.6)	0.015 <sup>†</sup>
*Do you know anyone personally who has been diagnosed with COVID-19?	344 (34.0)	75 (42.6)	269 (32.1)	0.008 <sup>†</sup>
*Do you know anyone personally who has died from complications associated with COVID-19?	74 (7.3)	17 (9.7)	57 (6.8)	n.s.
*Are you currently “sheltering in place” (i.e., not leaving home except for necessities)?	948 (93.6)	171 (97.2)	777 (92.8)	0.033
*Have you become worried about your ability to financially support yourself and loved ones?	555 (54.8)	157 (89.2)	398 (47.6)	<0.001 <sup>†</sup>
*Do you have someone you care about or who is emotionally close to you that you can talk to daily?	921 (90.9)	162 (92.0)	759 (90.7)	n.s.
*Do you feel socially isolated?	579 (57.2)	122 (69.3)	457 (54.6)	<0.001 <sup>†</sup>
*Do you feel like you have enough social/emotional support to get through this time?	844 (83.3)	128 (72.7)	716 (85.5)	<0.001 <sup>†</sup>
*Are you engaging in consistent “social distancing” around people (e.g., keeping 6 feet from others)?	977 (96.4)	174 (98.9)	803 (95.9)	n.s.
*Are you avoiding all contact with others outside of the home?	865 (85.4)	155 (88.1)	710 (84.8)	n.s.
*Do you touch others less?	957 (94.5)	167 (94.9)	790 (94.4)	n.s.
*Do you trust other people less?	519 (51.2)	102 (58.0)	417 (49.8)	0.05
*How often do you pray?				n.s.

(Continued)

TABLE 1 | Continued

Characteristics	Total sample (N = 1,013)	COVID-19 job loss (N = 176)	No job loss (N = 837)	p-Value
At least once a day	270 (27.4)	49 (29.0)	221 (27.0)	
1–6 days a week	113 (11.4)	19 (11.2)	94 (11.5)	
At least monthly	119 (12.1)	24 (14.2)	95 (11.6)	
Seldom or Never	485 (49.1)	77 (45.6)	408 (49.9)	
*Weekly exercise—min	36.2 ± 43.2	36.1 ± 46.3	36.2 ± 42.5	n.s.
*Over the past two weeks, how many days did you get outside during sunlight hours for more than 10 minutes?	4.7 ± 2.1	4.8 ± 2.0	4.7 ± 2.1	n.s.
*On average, how many minutes did you spend outside in the sunlight each day?	66.0 ± 68.0	68.0 ± 64.3	65.5 ± 68.8	n.s.
*How often do you have one drink containing alcohol?—% ≥2 times per wk	25.6%	21.0%	26.5%	n.s.
*How many drinks containing alcohol do you have on a typical day when you are drinking?—% ≥3 per session	30.2%	35.7%	29.1%	n.s.

<sup>†</sup>Significant at false discovery rate (FDR) correction,  $p < 0.05$ ; n.s., non-significant; yr, year; no., number.

\*Items included as potential predictors of mental health in the binomial logistic regression (as well as job loss category and insomnia severity, which are not listed).

anxiety disorder on the Zung SRAS, compared to 43.3% who had not lost their job.

Evidence of probable acute stress and post-traumatic stress reactions was evident in 22.9% and 25.0% of those who lost a job due to the coronavirus outbreak, respectively, compared to 13.5% and 16.4%, respectively, among those whose jobs were not affected.

While suicidal ideation on Item 9 of the BDI-II was not different between job-loss groups, there was a significant difference in suicidal ideation on Item 9 of the PHQ-9, with 25% of those who reported losing their job endorsing some level of suicidal ideation, compared to 16% of those who had not.

Finally, the data in **Table 2** also show that 32.4% of those who lost their job met or exceeded the cut-off for clinically significant insomnia on the ISI, while 23.5% of those who had not lost their job met this level of severity.

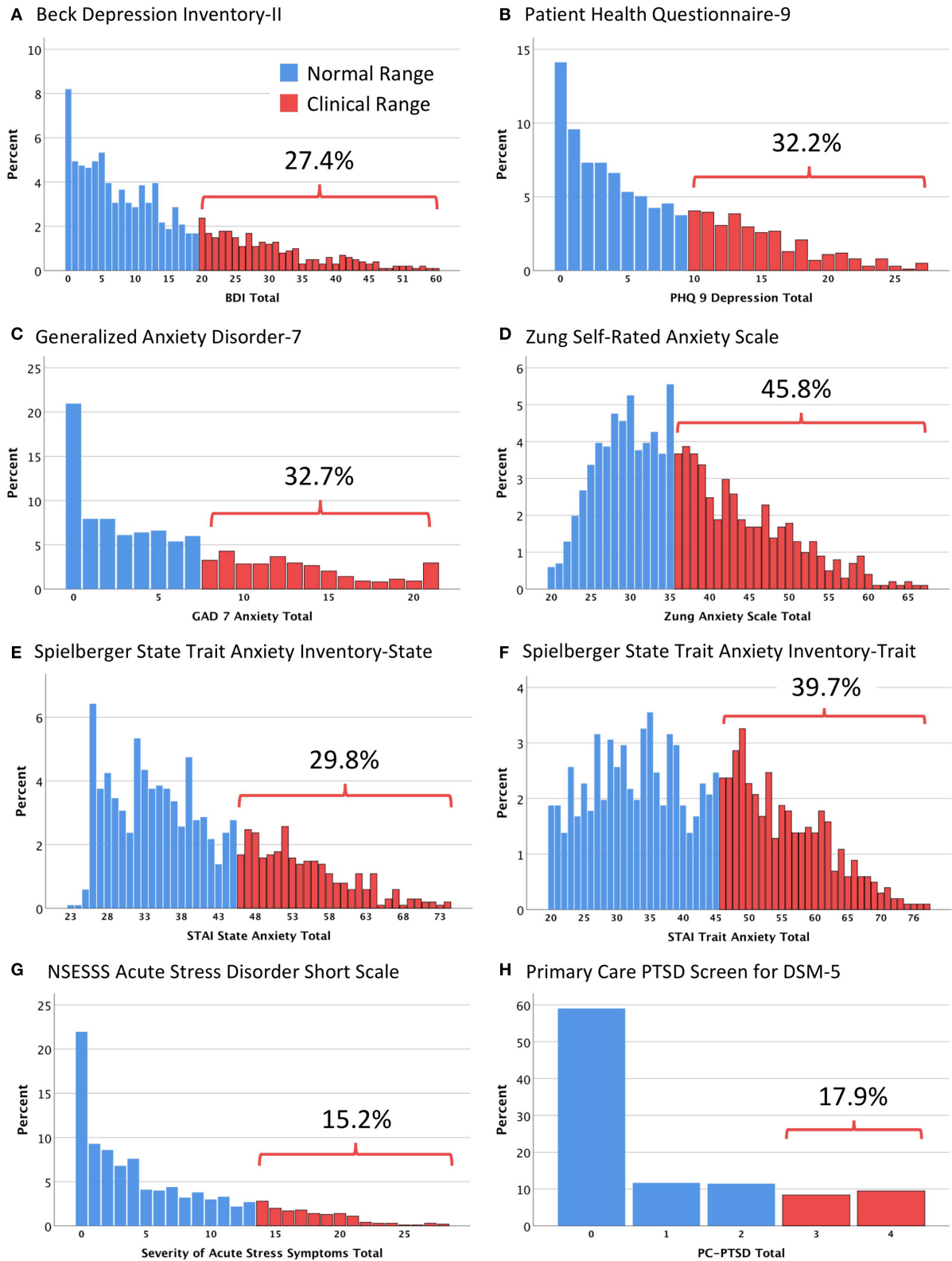
## Contributing Factors to Mental Health Outcomes

To identify some potential factors that may mitigate or exacerbate mental health problems during the pandemic, we queried participants on a series of questions related to concerns about COVID-19 (see **Table 1**). While it is acknowledged that no single set of variables will provide a comprehensive explanation of mental health issues, we selected a set of items focused on COVID-19 concerns that we believed would likely play a role in mental health responses to the pandemic. This approach, using background knowledge to aid in variable selection is considered to be an accepted approach to regression analysis (32). For the sample as a whole, a total of 28 potential variables of interest were initially included based on their relevance to pandemic-related concerns at the time, including fears of the virus itself, being in close proximity to someone with the virus, perceived social support, daily activities, alcohol consumption, and basic demographics. The analysis included the asterisked items in **Table 1**, as well as variables assessing job loss due

to the pandemic and insomnia severity. These 28 variables were entered into a binomial multiple logistic regression with forward selection to predict the likelihood of meeting positive screening criteria for each of the 10 mental health outcome variables with published cut-offs (see **Table 2**). The variables surviving selection for each model are listed in **Table 3**. The most significant predictors of meeting criteria for moderate to severe depression on the BDI-II and the PHQ-9 included worry about the ability to financially support oneself or family, feeling socially isolated, and greater alcohol use, while spending more days each week outside in the sunshine and feeling that one had enough social support appeared protective against depression. As evident in **Table 3**, while there were a number of factors associated with screening positive for an anxiety disorder on the GAD-7, Zung SRAS, STAI-S, and STAI-T, the most consistent predictors across measures included endorsing worry about the ability to financially support self or family, feeling socially isolated, and problems with insomnia, while spending more days per week outside in the sunshine appeared most consistently protective. The probability of meeting criteria for acute stress or post-traumatic stress reaction on the NSESSS or PC-PTSD was greatest among those reporting worry about financial problems, feeling socially isolated, trusting others less, and endorsing more problems with insomnia. Finally, screening positive for suicidal ideation on Item 9 of the BDI-II and PHQ-9 was most associated with endorsing financial worries, greater alcohol use, and problems with insomnia, while protective factors against suicidal ideation included male sex, older age, and feeling that one had enough social support to get through the crisis.

## DISCUSSION

The reported prevalence of mental health problems during the first weeks of the pandemic response in the U.S. was notably higher than expected based on general population



**FIGURE 1 |** Histograms showing the distribution of scores on the eight major mental health assessment questionnaires. **(A)** Beck Depression Inventory-II (BDI); **(B)** Patient Health Questionnaire-9 (PHQ 9); **(C)** Generalized Anxiety Disorder-7 (GAD 7); **(D)** Zung Self-Rated Anxiety Scale; **(E)** Spielberger State Trait Anxiety Inventory-State (STAI State); **(F)** Spielberger State Trait Anxiety Inventory-Trait (STAI Trait); **(G)** NSESS Acute Stress Disorder Short Scale; **(H)** Primary Care PTSD Screen for DSM-5 (PC-PTSD). Bars represent the percentage of participants obtaining a particular score. Each histogram divides the sample into those who met published cut-off points for clinical significance (blue, normal range; red, clinical range).

**TABLE 2 |** Mean scores and percent meeting clinical cut-offs on mental health outcomes between groups of individuals who lost or did not lose their primary employment due to the pandemic.

Outcome	Total sample (N = 1,013)	COVID-19 job loss (N = 176)	No job loss (N = 837)	p-Value
<b>BDI</b>				
Mean total	13.6 ± 12.0	17.5 ± 12.8	12.8 ± 11.7	<0.001 <sup>†</sup>
Clinically significant (BDI ≥ 20) {Beck, 1996 #3123}	278 (27.4)	67 (38.1)	211 (25.2)	0.001 <sup>†</sup>
<b>PHQ9</b>				
Mean total	7.1 ± 6.3	9.2 ± 6.9	6.6 (6.1)	<0.001 <sup>†</sup>
Clinically significant (PHQ9 ≥ 10) {Kroenke, 2001 #5911}	362 (32.2)	78 (44.3)	589 (29.6)	<0.001 <sup>†</sup>
<b>GAD7</b>				
Mean total	6.0 ± 5.8	8.0 ± 6.2	5.6 ± 5.6	<0.001 <sup>†</sup>
Clinically significant (GAD7 ≥ 8) {Plummer, 2016 #5914}	321 (32.7)	79 (45.4)	242 (29.9)	<0.001 <sup>†</sup>
<b>Zung SRAS</b>				
Mean total	36.2 ± 9.4	39.6 ± 10.2	35.5 ± 9.1	<0.001 <sup>†</sup>
Clinically significant (SRAS ≥ 36) {Dunstan, 2020 #5915}	462 (45.8)	101 (57.4)	361 (43.3)	0.001 <sup>†</sup>
<b>STAI-state</b>				
Mean total	40.3 ± 11.0	44.8 ± 11.3	39.3 ± 10.8	<0.001 <sup>†</sup>
Clinically significant (STAI-S ≥ 46) {Fisher, 1999 #5916}	302 (29.8)	80 (45.5)	222 (26.6)	<0.001 <sup>†</sup>
<b>STAI-trait</b>				
Mean total	41.7 ± 13.1	44.8 ± 12.9	41.0 ± 13.1	0.023 <sup>†</sup>
Clinically significant (STAI-T ≥ 46) {Fisher, 1999 #5916}	402 (39.7)	84 (47.7)	318 (38.0)	0.016 <sup>†</sup>
<b>NSESSS</b>				
Mean total	6.1 ± 6.3	7.9 ± 6.8	5.7 ± 6.1	0.001 <sup>†</sup>
Clinically significant (SASS ≥ 2) {Kilpatrick, 2013 #5917}	152 (15.2)	40 (22.9)	112 (13.5)	0.002 <sup>†</sup>
<b>PC-PTSD</b>				
Mean total	1.0 ± 1.4	1.3 ± 1.5	0.9 ± 1.3	0.014 <sup>†</sup>
Clinically significant (PC-PTSD ≥ 3) {Ouimette, 2008 #5910}	181 (17.9)	44 (25.0)	137 (16.4)	0.007 <sup>†</sup>
<b>Suicidal ideation (BDI Item 9)</b>				
Mean total	0.2 ± 0.7	0.2 ± 0.5	0.2 ± 0.5	n.s.
Clinically significant (BDI Item 9 ≥ 1)	178 (17.6)	37 (21.0)	141 (16.8)	n.s.
<b>Suicidal ideation (PHQ9 Item 9)</b>				
Mean total	0.3 ± 0.5	0.4 ± 0.8	0.3 ± 0.7	n.s.
Clinically significant (PHQ Item 9 ≥ 1)	178 (17.6)	44 (25.0)	134 (16.0)	0.004 <sup>†</sup>
<b>ISI</b>				
Mean total	9.5 ± 6.8	11.1 ± 6.9	9.2 ± 6.7	0.011 <sup>†</sup>
Clinically significant (ISI ≥ 15)	254 (25.1)	57 (32.4)	197 (23.4)	0.014 <sup>†</sup>

n.s., non-significant; yr, year; no., number. BDI, Beck Depression Inventory; PHQ, Patient Health Questionnaire; GAD7, Generalized Anxiety Disorder; SRAS, Self-Rated Anxiety Scale; STAI, State-Trait Anxiety Inventory; NSESSS, National Stressful Events Survey Acute Stress Disorder Short Scale; PC-PTSD, Primary Care Post-traumatic Stress Disorders inventory; ISI, Insomnia Severity Index.

<sup>†</sup> Significant at false discovery rate (FDR) correction,  $p < 0.05$ ; Mean comparisons corrected for prior income, formal educational attainment, and potential exposure to COVID-19 (i.e., personally showing symptoms of COVID-19; someone in household diagnosed with COVID-19).

estimates collected over the decade prior to the pandemic. Prior research has estimated that the 12-month prevalence for mental health problems in the general population to be approximately 9.3% for any major depressive episode, 2.9% for GAD, and 4.4% for PTSD (30), while reported suicidal ideation ranges from 2.0 to 3.7% (31). Our findings suggest that the prevalence of probable mental health problems at this early phase of the pandemic was higher than estimates from prior years. Consistent with other contemporaneous research (33), we found that major depression was 2.9–3.5 times higher than before the pandemic; GAD 10.3–15.8 times higher; and acute-stress/post-traumatic stress 3.5–4.0 times higher. Moreover,

suicidal ideation was found to be 4.8–8.8 times higher than prior population estimates. It should be kept in mind that brief screening methods such as those used here may tend to overestimate mental health prevalence rates relative to gold-standard clinical interviews (34), and that the comparison data were, in many cases, collected years earlier. Nonetheless, with due consideration to this risk, the magnitude of the findings raise serious concerns about the mental health status of the general U.S. population during the early phase of the COVID-19 pandemic.

As a result of necessary and vital efforts to slow the spread of the novel coronavirus, non-essential businesses were closed



**TABLE 3 |** Factors contributing to total sample mental health outcomes based on binomial logistic regression.

	Nagelkerke $R^2$	$\beta$ (SE)	p-Value	Adjusted odds ratio (95% CI)
BDI depression	0.39 <sup>†</sup>		<0.001	
Worry about ability to financially support self/family		0.90 (0.19)	<0.001	2.45 (1.70–3.54)
Feel socially isolated		0.50 (0.19)	0.011	1.64 (1.12–2.40)
Alcoholic drinks per day		0.25 (0.10)	0.013	1.28 (1.05–1.55)
Insomnia severity index score		0.13 (0.01)	<0.001	1.13 (1.10–1.17)
Age—yr		−0.03 (0.01)	<0.001	0.97 (0.96–0.99)
Days outside in sunlight per week—no.		−0.10 (0.04)	0.012	0.90 (0.83–0.98)
Have enough social support to get through this		−1.07 (0.21)	<0.001	0.34 (0.22–0.52)
PHQ-9 depression	0.46 <sup>†</sup>		<0.001	
Worry about ability to financially support self/family		0.60 (0.18)	0.001	1.83 (1.28–2.61)
Feel socially isolated		0.58 (0.19)	0.003	1.78 (1.23–2.60)
Alcoholic drinks per day		0.35 (0.10)	<0.001	1.42 (1.17–1.73)
Insomnia severity index score		0.19 (0.02)	<0.001	1.20 (1.17–1.24)
Days outside in sunlight per week—no.		−0.18 (0.04)	<0.001	0.84 (0.77–0.91)
Touch others less		−0.78 (0.36)	0.029	0.46 (0.23–0.92)
Have enough social support to get through this		−0.81 (0.23)	<0.001	0.45 (0.29–0.69)
GAD-7 generalized anxiety disorder	0.42 <sup>†</sup>		<0.001	
Worry about ability to financially support self/family		0.84 (0.18)	<0.001	2.33 (1.64–3.30)
Feel socially isolated		0.76 (0.18)	<0.001	2.13 (1.49–3.05)
Female sex		0.56 (0.17)	0.001	1.75 (1.25–2.47)
Trust others less		0.41 (0.17)	0.017	1.51 (1.08–2.12)
Insomnia severity index score		0.16 (0.01)	<0.001	1.17 (1.14–1.21)
Age—yr		−0.03 (0.01)	<0.001	0.97 (0.96–0.99)
Days outside in sunlight per week—no.		−0.11 (0.04)	0.005	0.89 (0.82–0.97)
Anyone in household been diagnosed with COVID-19		−1.54 (0.65)	0.019	0.21 (0.06–0.78)
Zung SRAS anxiety disorder	0.47 <sup>†</sup>		<0.001	
Worry about ability to financially support self/family		0.81 (0.16)	<0.001	2.24 (1.62–3.09)
Trust others less		0.70 (0.16)	<0.001	2.02 (1.46–2.78)
Female sex		0.50 (0.17)	0.002	1.65 (1.20–2.29)
Know someone personally diagnosed with COVID-19		0.38 (0.17)	0.026	1.46 (1.05–2.03)
Feel socially isolated		0.36 (0.17)	0.031	1.44 (1.03–2.00)
Alcoholic drinks per day		0.22 (0.10)	0.026	1.25 (1.03–1.52)
Insomnia severity index score		0.18 (0.01)	<0.001	1.20 (1.16–1.23)
Days outside in sunlight per week—no.		−0.15 (0.04)	<0.001	0.86 (0.80–0.93)
Touch others less		−0.98 (0.35)	0.005	0.38 (0.19–0.74)
STAI-state anxiety disorder	0.36 <sup>†</sup>		<0.001	
Worry about ability to financially support self/family		1.06 (0.18)	<0.001	2.87 (2.03–4.08)
Feel socially isolated		0.73 (0.19)	<0.001	2.07 (1.44–2.98)
Female sex		0.48 (0.17)	0.005	1.61 (1.15–2.24)
Insomnia severity index score		0.13 (0.01)	<0.001	1.14 (1.11–1.17)
Days outside in sunlight per week—no.		−0.10 (0.04)	0.008	0.90 (0.84–0.97)
High risk for COVID-19		−0.39 (0.18)	0.035	0.68 (0.48–0.97)
Have enough social support to get through this		−0.44 (0.21)	0.037	0.64 (0.43–0.97)
STAI-trait anxiety disorder	0.35 <sup>†</sup>		<0.001	
Worry about ability to financially support self/family		0.68 (0.16)	<0.001	1.97 (1.44–2.68)
Feel socially isolated		0.67 (0.17)	<0.001	1.96 (1.42–2.71)
Prayer frequency		0.22 (0.06)	<0.001	1.25 (1.11–1.40)
Insomnia severity index score		0.10 (0.01)	<0.001	1.11 (1.08–1.14)
Min of exercise per week		−0.01 (0.00)	0.008	0.99 (0.99–1.00)

(Continued)

TABLE 3 | Continued

	Nagelkerke $R^2$	$\beta$ (SE)	p-Value	Adjusted odds ratio (95% CI)
Age—yr		−0.02 (0.01)	0.009	0.98 (0.97–1.00)
Days outside in sunlight per week—no.		−0.14 (0.04)	<0.001	0.87 (0.81–0.94)
Touch others less		−0.71 (0.32)	0.026	0.49 (0.26–0.92)
Have enough social support to get through this		−0.75 (0.22)	0.001	0.47 (0.31–0.72)
NSESS acute stress disorder	0.34 <sup>†</sup>		<0.001	
Been tested for COVID-19		1.15 (0.45)	0.010	3.17 (1.32–7.59)
Trust others less		0.80 (0.23)	<0.001	2.22 (1.42–3.49)
Worry about ability to financially support self/family		0.75 (0.24)	0.002	2.11 (1.32–3.39)
Feel socially isolated		0.69 (0.25)	0.005	2.00 (1.23–3.27)
Insomnia severity index score		0.14 (0.02)	<0.001	1.15 (1.11–1.19)
Age—yr		−0.05 (0.01)	<0.001	0.96 (0.94–0.98)
Prayer frequency		−0.18 (0.08)	0.030	0.84 (0.71–0.98)
Currently sheltering in place		−0.79 (0.38)	0.038	0.45 (0.21–0.96)
PC-PTSD screen positive	0.28 <sup>†</sup>		<0.001	
Feel socially isolated		0.74 (0.22)	0.001	2.10 (1.36–3.23)
Worry about ability to financially support self/family		0.70 (0.21)	0.001	2.01 (1.33–3.06)
Showing symptoms of COVID-19		0.69 (0.25)	0.005	1.99 (1.23–3.23)
Know someone personally who died from COVID-19		0.61 (0.31)	0.049	1.84 (1.00–3.37)
Trust others less		0.51 (0.20)	0.011	1.66 (1.12–2.46)
Insomnia severity index score		0.11 (0.01)	<0.001	1.12 (1.09–1.15)
BDI suicidal ideation	0.23 <sup>†</sup>		<0.001	
Worry about ability to financially support self/family		0.64 (0.20)	0.002	1.89 (1.27–2.81)
Alcoholic drinks per day		0.33 (0.10)	0.001	1.38 (1.14–1.68)
Insomnia severity index score		0.07 (0.01)	<0.001	1.07 (1.04–1.10)
Average minutes outside in sunlight per day—no.		0.00 (0.00)	0.021	1.00 (0.99–1.00)
Age—yr		−0.02 (0.01)	0.012	0.98 (0.96–1.00)
Female sex		−0.54 (0.19)	0.004	0.58 (0.40–0.84)
Someone emotionally close...can talk to daily		−0.63 (0.27)	0.021	0.53 (0.31–0.91)
Touch others less		−0.82 (0.35)	0.018	0.44 (0.22–0.87)
Have enough social support to get through this		−0.89 (0.22)	<0.001	0.41 (0.27–0.63)
PSQ-9 suicidal ideation	0.26 <sup>†</sup>		<0.001	
Worry about ability to financially support self/family		0.55 (0.21)	0.007	1.74 (1.16–2.61)
Alcoholic drinks per day		0.31 (0.10)	0.002	1.37 (1.12–1.67)
Insomnia severity index score		0.09 (0.01)	<0.001	1.09 (1.06–1.13)
Age—yr		−0.03 (0.01)	0.004	0.97 (0.96–0.99)
Days outside in sunlight per week—no.		−0.15 (0.04)	0.001	0.86 (0.79–0.94)
Female sex		−0.50 (0.19)	0.009	0.61 (0.42–0.88)
Touch others less		−0.77 (0.36)	0.032	0.46 (0.23–0.93)
Have enough social support to get through this		−0.96 (0.21)	<0.001	0.38 (0.25–0.58)

<sup>†</sup> Significant at false discovery rate (FDR) correction,  $p < 0.05$ ; n.s., non-significant; yr, year; no., number.

and tens of millions of Americans found themselves out of work. Consistent with the unemployment data from the first month of the shutdown restrictions, 17.4% of the participants in this study reported having lost their primary job as a direct result of the COVID-19 pandemic. While mental health problems were notably high for the sample as a whole, those who lost their primary job directly as a result of the pandemic consistently showed greater severity across all measures of

depression, anxiety, and stress responses. The prevalence of clinically significant mental health problems was 1.5–1.7 times higher among those who reported a COVID-19-related job loss than those who did not report such a loss. Large meta-analyses have shown that mental health problems are about twice as prevalent among individuals who are unemployed than those who are employed (35). Our findings suggest that the difference in the rates of mental health problems between those who did

and did not lose their jobs appears to be very similar to those of prior studies, but perhaps slightly smaller in the magnitude of difference, probably due to elevated rates of general pandemic-related concerns even among those who did not experience a COVID-related job loss. Unemployment and financial insecurity are well known contributors to poorer mental health, including depression and suicide (6). Our data are consistent with the existing literature and suggest that the rise in unemployment during the pandemic is associated with significantly elevated mental health problems.

For the sample as a whole, poorer mental health outcomes tended to be predicted by greater worry about the ability to financially support oneself or loved ones, feeling socially isolated, greater severity of insomnia symptoms, and consuming more alcohol. On the other hand, consistent with prior research, protective factors included spending more days per week outside in the sunlight, perceiving enough social and emotional support to get through the crisis, and older age. The contributory role of each of these factors is not surprising and all have been supported by considerable research (13, 36–43). In particular, numerous studies suggest that younger age groups have exhibited greater mental health problems as a result of the pandemic (40–43). Ways to encourage safe outside activities and facilitate social and emotional support need to be explored and encouraged to help individuals maintain resilience and wellbeing during the pandemic stay-at-home period.

How can these data inform psychiatric care and public health policy? The data suggest that subjective reports of financial worry represented the most consistent and predictive factor associated with meeting criteria for clinically significant mental health problems. Because of the extraordinarily high level of job loss produced as a direct consequence of the pandemic response, these findings suggest that efforts to address the personal financial impacts of the pandemic are going to be pivotal contributors to averting an impending mental health crisis. Social isolation and a sense of insufficient social support each also contributed significantly to mental health problems. This is consistent with other data suggesting that loneliness has increased during the course of the pandemic, and is associated with suicidal ideation and other mental health issues (36, 44, 45). Clearly, any successful psychiatric mitigation strategy will need to address the profound issues surrounding the current reduction in face-to-face human interaction and the widespread experience of loneliness (46). Problems with insomnia were also highly predictive of poorer mental health, suggesting that sleep assessment should be incorporated into routine clinical contacts and behavioral and medical efforts aimed toward facilitating better sleep health should be a priority (47). Further, suicidal ideation was predicted by greater alcohol intake in combination with financial worries. This is particularly concerning, as recent evidence suggests that alcohol purchases, consumption, and dependence behaviors increased dramatically for those under lockdown during the first 6-months of the pandemic (39, 48, 49). For those at risk of suicidal ideation, alcohol intake should be minimized/avoided (5). Finally, spending more days outside in sunlight was frequently a predictor of positive mental health outcomes. Light exposure is important for enhancing mood and maintaining a healthy sleep schedule (50). Even during prolonged

stay-at-home mandates, it is recommended that individuals find ways to increase daylight exposure and, when appropriate, to engage safely and responsibly in appropriately socially distanced outdoor activities to maintain mental health and wellbeing.

A small, but interesting finding is also worthy of note. In **Table 3**, we found that scores on the GAD-7 were lower among individuals who also reported that they lived with someone in the household who had been diagnosed with COVID-19. We interpret this counterintuitive finding as the effect of seeing COVID-19 first-hand, which may have reduced anxiety over the unknown. During the early weeks of the pandemic, not much was known about the virus, which led to much speculation and widespread worry. Since the vast majority of people who contract COVID-19 tend to be asymptomatic or experience only mild illness, the experience of direct exposure to someone who has been diagnosed and potentially recovered may actually have reduced their anxiety by making the illness concrete. Of course, this is *post-hoc* speculation, and will require further research.

While the present sample was collected to be representative of the general U.S. population, it is important to keep in mind that the data may not be representative of the mental health responses in other areas of the world. COVID-19 has affected every country on the globe, but the response to the pandemic has been different across cultures. For instance, cultures that adhere to tightly to social norms appear to have fared much better with regard to the number of COVID-19 cases and deaths than cultures that adhere much more loosely to such norms (such as the U.S.) (51). Consequently, the willingness to accept the necessity or legitimacy of the government lockdowns and their repercussions on social or occupational functioning may play a role in how job loss may be perceived and how it may affect mental health. The present research does not directly address this issue, but it will be one that is important for further study. In the meantime, the generalizability of these findings to other cultures with different values should be considered as tentative until validated with further research in other countries around the world.

This study was limited by its use of self-report measures and online questionnaires rather than in-person clinical interviews. Future work will involve more extensive clinical interviews and longitudinal data collection to monitor changes during the course of the pandemic. Furthermore, at the time when these data were first collected, there were no readily available validated COVID-19 metrics to assess mental health issues, which is a clear limitation. Since that time, validated metrics such as the Fear of COVID-19 Scale have become available (52), and are recommended for use in future COVID-19-related studies. The present findings are also limited by the fact that most of the large epidemiological samples to which we compared our findings were collected some time ago and may differ somewhat from the demographics of the current sample. Population prevalence rates for various disorders change over time and so it is possible that our findings overestimate the prevalence of these mental health issues. Additionally, the questionnaires we used were generally designed for screening purposes rather than comprehensive psychodiagnostic assessment. Such metrics are often designed for high sensitivity relative to specificity, and may lead to an overestimation of the prevalence of certain disorders (34).

These limitations notwithstanding, the present findings strongly suggest that the U.S. population experienced extraordinary mental health concerns in the first weeks after nationwide pandemic restrictions were enacted (14). It is conceivable that these mental health problems will persist or even increase in the coming months and years as the long-term occupational and personal financial fallout from the pandemic continues to be realized. Large scale efforts to mitigate the effects of financial instability and facilitate social connectedness will be crucial to minimizing the long-term impact of the pandemic on mental health.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Arizona Institutional Review Board. The patients/participants provided their electronic informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

WK primary study design and conceptualization, primary literature search, data analysis, data interpretation, writing of the initial draft, and figures and tables. SC contributed to study design, data collection, and editing drafts of manuscript. ET and ND contributed to study design and editing drafts of manuscript. All authors contributed to the article and approved the submitted version.

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# Retrospective Analysis of Psychological Factors in COVID-19 Outbreak Among Isolated and Quarantined Agricultural Students in a Borneo University

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**Introduction:** Much has been known about the psychological issues that can emerge in people who are quarantined and unable to move freely. The COVID-19 pandemic has no contrast from previous outbreaks like SARS and MERS regarding their ensuing worries and boosted anxiety levels. This article seeks to examine the unique psychological changes that occur in students who have been quarantined inside a university campus and assess sociodemographic factors associated with certain psychological factors.

**Methodology:** The data was collected from students in an Agricultural Campus. In the first phase, the factor structure of the modified National Index Psychological Wellness (NIPW) was acceptable, and to establish statistical parameters for validation an exploratory factor analysis was done. In the second phase, Independent *T*-tests, ANOVA, and Hierarchical Multiple regression were performed. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0.

**Result/Discussion:** A total of 46 male and 76 female students enrolled in this study. The Bartlett's test of sphericity was significant ( $p < 0.001$ ) and the Kaiser–Mayer–Olkin measure of sampling adequacy for the AUDIT-M was 0.901. The Cronbach's alpha of the entire modified NIPW was 0.657 which suggests reasonable internal consistency and subscales between 0.913 and 0.924. Raw scores of 12 positive items were higher for the quarantined group except for "I can do daily routines," "I understand what happens," and "I understand the action that is performed is fair." Raw mean scores of eight negative scoring items were higher in the quarantined group, except for "I feel angry" (2.88 vs. 2.89 for non-quarantined group). There were statistically significant differences between year groups for the questions "I understand what happens," "I understand the action that is performed is fair," and "I think everyone is good."

**Conclusion:** Movement control orders or compulsory quarantine orders can be distressing and may cause understandable psychological sequelae. Holistic

management of a quarantine center that addresses the needs and health of an individual student will give a positive impact on psychological wellness. Quarantining facilities can be a place of positivity, allowing people to live a shared experience together, provide peer support for each other, and give each other hope.

**Keywords:** sociodemographic factors, quarantine status, indices of psychological, wellness, Borneo Agricultural Campus

## INTRODUCTION

COVID-19, a pandemic from the coronavirus family, was first described in December 2019 in China. Malaysia had its first confirmed case on the 25th of January 2020. Subsequently, as the cases continued to rise in March 2020, Malaysia was placed under a strict nationwide movement restriction order (MRO) beginning 18 March 2020 in order to flatten the curve via state-sanctioned social distancing (1).

Hence, public university students who are studying far away from their hometowns are put in a unique quandary. The majority of them, especially those studying in Sabah and Sarawak, are a 2.5 h flight away from home. Due to flight frequencies being dramatically reduced and strict movement controls between West and East Malaysia, a lot of them have been effectively isolated in the campus (2). Furthermore, there are a small subgroup of students who have been forced to quarantine for 14 days, as they are either “persons under investigation” due to possible COVID-19 symptoms, or “persons under surveillance” due to direct or indirect contact with an individual suspected of COVID-19. In this case, quarantine involves separating groups who are potentially exposed to the disease, hence reducing the risk of infecting others. Isolation, on the other hand, is physical separation of individuals confirmed to be infected by the contagious disease (3). This is further contrasted with students who are merely subjected to the standard movement control order (MCO), who are free to go to buy food and provisions individually but otherwise cannot travel in excess of 10 km. In this case, the population of the agricultural campus was largely under MCO, with a small group subjected to quarantine, and none under isolation. This compulsory quarantine practiced in the agricultural campus is different in nature from movement restriction, as individuals under nationwide movement restrictions are still allowed to go out to purchase food and daily necessities while practicing sufficient social distancing. Quarantined students, on the other hand, were not allowed to leave their quarantine centers, and hence everything was delivered contactless to their doorsteps. The term quarantine and isolation themselves are sometimes used interchangeably, but actually carry different meanings. Both terminologies involve physical separation from the community.

There have been many literatures detailing the psychological issues that can emerge in people who are unable to move freely, or even worse, quarantined (4). However, there is still scant literature for psychological sequelae of COVID-19 quarantining and movement restrictions globally. Previous studies done with Severe Respiratory Syndrome (SRAS) and Middle East Respiratory Syndrome (MERS) survivors suggest that levels of worry and anxiety are heightened (5). As a result of quarantined

cohort study with SARS survivors revealed DSM-IV psychiatric disorders was 58.9%. Furthermore, almost 25% of SARS survivors experienced Post-Traumatic Stress Disorder (PTSD) and 15.6% had significant depression (6). Older adult suicide deaths, as a proxy for diagnosable psychiatric disorders, was reportedly higher among individuals affected by SARS in 2003 and 2004 (7). There was also lower quality of life highlighted among MERS survivors that was influenced indirectly by longer duration (8). However, much of this data examined the population as a whole, instead of specifically examining the differences between the quarantined group and movement-restricted individuals.

There has been ample literature detailing the psychological issues that can emerge in people who are unable to move freely, or even worse, quarantined, including depression, insomnia, stress, anxiety, anger and fear (9). The focus on measures to prevent spread of COVID-19 may distract public attention to mental health issues, which can lead to long term health problems and even stigma if unchecked. Management of COVID-19 should hence be inclusive not only of the treatment and prevention of this pandemic, but also the mental health impact of patients and general population. One of the non-pharmacological approaches in reducing mental health issues in the population during this pandemic includes educating them to practice healthy lifestyle such as exercise. Physical activity has significant positive impacts on psychological health (10) and can enhance self-esteem, and reduce depression, anxiety, and stress.

An operational survey was performed among the students in the agricultural campus, to assess whether or not the students inside quarantine were experiencing similar, not elevated, psychological distress compared to those outside quarantine. As a result, it assessed whether those who were living outside and inside quarantine were having the same psychological experience.

The objective of this study is 2-fold. Firstly, it was to assess the levels of psychological well-being on 20 different domains. Secondly, it was to assess whether three sociodemographic factors—gender, year of study (a corollary to age), and quarantine status were associated with any differences in well-being on those domains. If the physical and psychological support for those in quarantine were similar to those outside quarantine, and there was no real deficit of experience being inside quarantine, it was then hypothesized that there should be no statistical difference in well-being, whether the individual was in or out of quarantine.

## METHODOLOGY

This was a retrospective analysis of data that was collected for operational purposes in the Agricultural Campus of a Bornean university during the beginning of the Movement Control Order

in Malaysia. Hence, it was not possible to select a questionnaire that was most suited for research purposes, and the researchers did not have the opportunity to intervene in the methods of selection of respondents. Students of the agricultural campus were approached by the operational team to take part in the questionnaire and provided written informed consent for participation. The inclusion criteria were as follows:-

- Above 18 years of age.
- Willing to participate in the study.
- Able to read and converse fluently in Malay language.

Apart from not consenting to join the study, there were no explicit exclusion criteria for the study, as the original data set was collected for operational, not research purposes, so no effort was made to exclude acute medical or psychiatric illness. The study participants completed two separate questionnaires: firstly, a simple demographic questionnaire containing age, gender, year of study, and whether or not the individual was quarantined or allowed to move freely; and secondly, a 20-item questionnaire adapted from the National Index of Psychological Well-being Malaysia (NIPW). Both questionnaires were in Bahasa Malaysia, the national language of Malaysia. The original NIPW is a Malay language questionnaire designed by the Public Services Department of Malaysia to assess psychological well-being for operational purposes in various governmental departments. It is used as a standard measure of well-being in University Malaysia Sabah, the site of this study. The original NIPW contains 36 questions about various aspects of wellness. For the purposes of the operational data collection, only 10 of the original questions were adopted directly, whereas eight other questions were adapted from the NIPW, and two new questions which did not measure items related to COVID-19 were added: "I feel lonely" and "I feel that the actions taken so far were reasonable." This yielded a 20-item modified version of the NIPW. Then the questionnaire was distributed in google form, for which the students were given a link. Those answering the questionnaire were required to log in via email, and their student's registration number was then inserted. After answering the questionnaire, they were unable to repeat or modify their answers once they logged out.

Data analyses were conducted using the Statistical Package for the Social Sciences version 26.0 (SPSS, Chicago, IL) by independent researchers unrelated to the operational team to reduce bias. In the first phase of data analysis, in order to examine if the factor structure of the MODIFIED NIPW was acceptable and to establish statistical parameters for validation, an exploratory factor analysis was done. Principal component analysis with direct oblimin rotation was done to explore the factor structure of the MODIFIED NIPW. Adopting eigenvalues  $>1$  and examining the scree plot were used to assess optimal number of factors. Examination of the pattern matrix was performed to examine respective factor loadings, and all factor loadings with correlations  $<0.3$  were excluded. Cronbach's alpha was used to assess the internal consistency of MODIFIED NIPW and its embedded subscales. Measures of concurrent validity were unfortunately not able to be done, as this was a retrospective analysis of collected data.

In the second phase of data analysis, the data was assessed using descriptive statistics, including skewness and kurtosis to examine for assumptions of normality. Independent *T*-tests were performed to examine if there was any significant difference in scores for all 20 items of the MODIFIED NIPW for gender and quarantine status. ANOVA was performed to examine if there was any significant difference in scores for all 20 items of the year of study (divided into Year 1, Year 2, Year 3, and postgraduate). Bonferroni correction was further performed after ANOVA to assess if any significant difference remained. Correlations were calculated between all 20 items of the scale. Hierarchical multiple regressions were performed for all 20 items of the MODIFIED NIPW, adjusting hierarchically for age, gender, and quarantine status.

Permission to conduct the retrospective analysis was obtained from the Medical Ethics Committee of University Malaysia Sabah. There was no conflict of interest or sponsorship from pharmaceutical companies. However, this project was performed as part of an operational screening for UMS students, so it was impossible to ensure that all participants were blinded against each other's answers.

## RESULT

### Descriptive Analysis of Data

A total of 122 participants were enrolled. There are 46 male and 76 female students. Skewness and kurtosis for all variables was  $<2.00$  suggesting a normal distribution. In terms of education levels, 100% of the respondents had completed secondary education, and there were 16 respondents that had completed first degree education.

### Factor Analysis

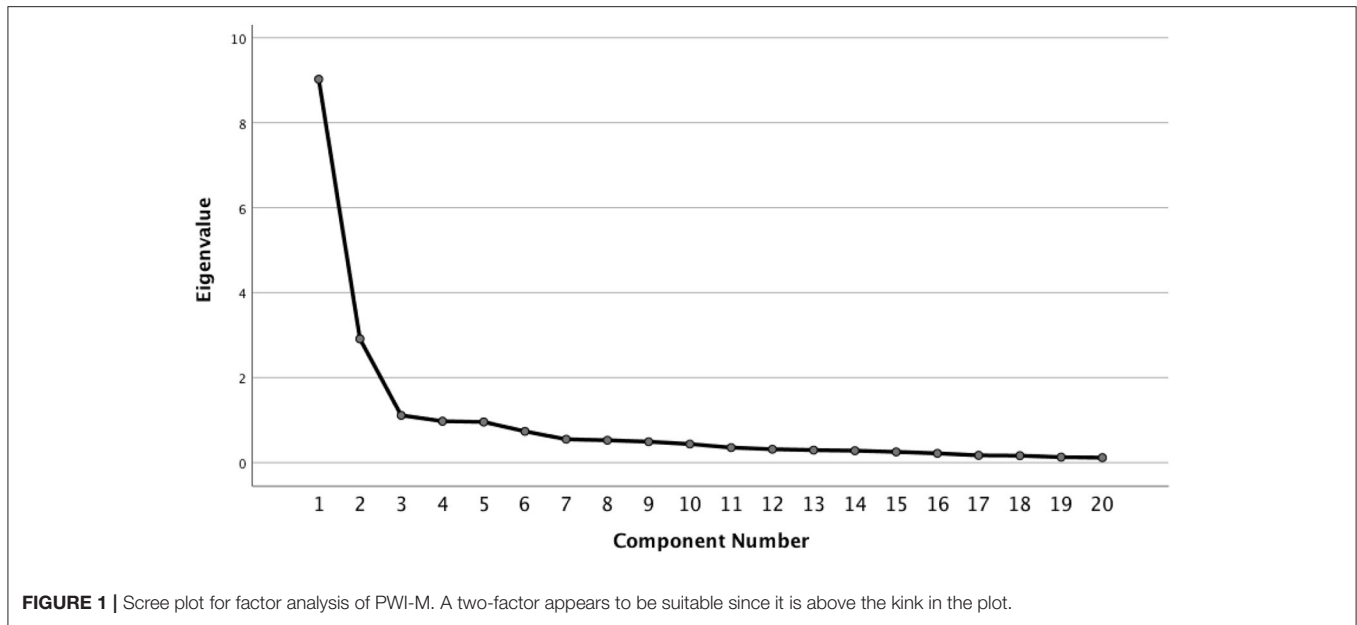
The Barlett's test of sphericity was significant ( $p < 0.001$ ) and the Kaiser–Mayer–Olkin measure of sampling adequacy for the AUDIT-M was 0.901 indicating acceptable sampling (11) (Table 2). Principal component analysis produced three factors  $>1.000$  when examining the eigenvalues. However, the third factor in the model had an eigenvalue barely exceeding 1.000. The second factor had an eigenvalue of 2.911, with the first two factors already accounting for 59.64% of the variance.

When examining the scree plot (Figure 1), a two-factor appears to be suitable too, as it is above the kink in the plot. Hence correlation matrices for the two-factor solution was examined.

When a two-factor solution was used, after excluding all factors with coefficients of 0.3 and below (Table 1). The first factor, accounting for 45.116% of the variance, consisted of the 12 questions with "positive" responses, e.g., "I am happy," and was called the "positive factor." The correlations were all  $>0.458$  and the Cronbach alpha for the first factor was 0.913. The second factor consisted of all the eight questions with "negative" responses, e.g., "I am angry," and was called the "negative factor," accounting for 14.56% of the variance. The correlations were all  $>0.590$ , with a Cronbach alpha of 0.924.

Observing the pattern matrix for correlations (Table 2), only one item in the "Positive factor": "I am happy" had correlations in both factors. On the other hand, also, only one item in the





**FIGURE 1 |** Scree plot for factor analysis of PWI-M. A two-factor appears to be suitable since it is above the kink in the plot.

**TABLE 1 |** Two factor solution analyze of questionnaire.

Component	Total	Initial eigenvalues		Extraction sums of squared loading			Rotation sums of squared loadings
		% of variance	Cumulative %	Total	% of variance	Cumulative %	Total
1	9.023	45.116	45.116	9.023	45.116	45.116	7.297
2	2.911	14.555	59.670	2.911	14.555	59.670	7.020
3	1.111	5.557	65.227				
4	0.974	4.868	70.095				
5	0.956	4.781	74.876				
6	0.736	3.678	78.5547				
7	0.550	2.749	81.303				
8	0.526	2.630	83.933				
9	0.492	2.458	86.391				
10	0.436	2.182	88.574				
11	0.353	1.767	90.340				
12	0.313	1.566	91.907				
13	0.294	1.472	93.379				
14	0.280	1.399	94.777				
15	0.251	1.256	96.033				
16	0.218	1.089	97.122				
17	0.170	0.851	97.973				
18	0.162	0.812	98.786				
19	0.128	0.638	99.424				
20	0.115	0.576	100.000				

All factors with coefficients of 0.3 and below.  
Extraction Method: Principal Component Analysis.

“Negative factor”: “I am angry” had correlations in both factors. Otherwise, none of the other 18 questions had correlations in two factors. When examining a three-factor model, five different questions had cross-correlations across three different factors, so it was less suitable as a model.

### Internal Consistency

Cronbach’s alpha of the entire modified NIPW was 0.657 which suggests reasonable internal consistency. The Cronbach alpha of the subscales were between 0.913 and 0.924. Concurrent validity was not able to be performed in this study, as it was

**TABLE 2 |** Pattern matrix of questionnaire.

No.	Questionnaire	1	2
1.	I feel safe	0.676	
2.	I feel happy	0.458	-0.500
3.	I feel appreciated and protected	0.746	
4.	I feel lonely		0.819
5.	I feel negative		0.832
6.	I feel sad		0.816
7.	I feel disappointed		0.892
8.	I feel moody		0.773
9.	I'm feeling worried		0.701
10.	I'm feeling depressed		0.835
11.	I feel angry	-0.371	0.590
12.	My life is very good	0.687	
13.	I can do daily routines	0.550	
14.	I'm satisfied about my life right now	0.662	
15.	I can accept it as it is	0.711	
16.	I have something important in contributing to the country	0.589	
17.	I always involve myself in the community	0.706	
18.	I understand what happens	0.791	
19.	I understand the action that is performed is fair	0.780	
20.	I think everyone is good	0.775	

One item in the "Positive factor": "I am happy" had correlations in both factors. One item in the "Negative factor": "I am angry" had correlations in both factors. Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. A Rotation converged in seven iterations.

**TABLE 3 |** Questionnaire analysis between quarantined and non-quarantined groups.

Items	Items quarantine (n = 16) mean (SD)	Non-quarantine (n = 106) mean (SD)	Mean diff. (95% CI)	t-statistic (df = 120)	P-value
I feel safe	4.38 (0.806)	4.05 (1.0720)	0.328 (-0.226, 0.882)	1.172	0.244
I feel happy	2.81 (1.167)	2.79 (1.209)	0.02 (-0.619, 0.659)	0.062	0.951
I feel appreciated and protected	3.88 (1.088)	3.76 (1.1)	0.111 (-0.473, 0.694)	0.376	0.707
I feel lonely	3.69 (1.138)	3.55 (1.164)	0.14 (-0.476, 0.757)	0.451	0.653
I feel negative	3.13 (1.31)	3.02 (1.179)	0.106 (-0.529, 0.741)	0.331	0.741
I feel sad	3.31 (1.078)	3.27 (1.306)	0.039 (-0.641, 0.718)	0.113	0.91
I feel disappointed	3.13 (1.025)	3.13 (1.273)	-0.007 (-0.668, 0.654)	-0.021	0.983
I feel moody	3.19 (1.109)	3.02 (1.28)	0.169 (0.5, 0.838)	0.499	0.619
I'm feeling worried	3.56 (1.094)	3.11 (1.26)	0.449 (-0.209, 1.108)	1.351	0.179
I feel angry	2.88 (1.258)	2.89 (1.319)	-0.012 (-0.708, 0.685)	-0.034	0.973
My life is very good	3.38 (1.204)	3.31 (1.072)	0.064 (-0.515, 0.642)	0.218	0.828
I can do daily routines	2.63 (1.31)	2.69 (1.334)	-0.064 (-0.77, 0.643)	-0.178	0.859
I'm satisfied about my life right now	2.75 (1.238)	2.86 (1.245)	-0.108 (-0.769, 0.552)	-0.325	0.746
I can accept it as it is	3.38 (0.957)	3.27 (1.126)	0.101 (-0.486, 0.689)	0.342	0.733
I have something important in contributing to the country	4 (0.894)	3.49 (1.181)	0.509 (-0.101, 1.12)	1.653	0.101
I always involve myself in the community (work around it)	3.44 (0.892)	3.32 (1.109)	0.117 (-0.459, 0.692)	0.402	0.689
I understand what happens	3.88 (0.885)	4.26 (0.898)	-0.389 (-0.865, 0.087)	-1.619	0.108
I understand the action that is performed is fair	3.69 (1.138)	3.76 (1.192)	-0.077 (-0.706, 0.553)	-0.241	0.81
Performed is fair i think everyone is good	3.63 (0.957)	3.56 (1.196)	0.068 (-0.552, 0.689)	0.218	0.828

Raw scores of 12 positive items were higher for the quarantined group except for "I can do daily routines," "I understand what happens," and "I understand the action that is performed is fair." Raw mean scores of eight negative scoring items were higher in the quarantined group, except for "I feel angry".

**TABLE 4 |** Questionnaire analysis between gender groups.

Items	Male (n = 46) mean (SD)	Female (n = 76) mean (SD)	Mean diff. (95% CI)	t-statistic (df = 120)	P-value
I feel safe	3.93	4.18 (0.976)	-0.249 (-0.635, 0.136)	-1.282	0.202
I feel happy	3.02 (1.2560)	2.66 (1.15)	0.364 (-0.076, 0.804)	1.636	0.104
I feel appreciated and protected	3.76 (0.993)	3.79 (1.158)	-0.029 (-0.435, 0.378)	-0.139	0.889
I feel lonely	3.63 (1.082)	3.53 (1.205)	0.104 (-0.325, 0.533)	0.48	0.632
I feel negative	3.02 (1.125)	3.04 (1.238)	-0.018 (-0.46, 0.425)	-0.079	0.937
I feel sad	3.22 (1.052)	3.32 (1.397)	-0.098 (-0.571, 0.375)	-0.412	0.681
I feel disappointed	3.28 (1.129)	3.04 (1.301)	0.243 (-0.215, 0.701)	1.05	0.296
I feel moody	3.11 (1.016)	3 (1.386)	0.109 (-0.357, 0.575)	0.462	0.645
I'm feeling worried	3.26 (1.021)	3.12 (1.366)	0.142 (-0.319, 0.604)	0.611	0.542
I'm feeling depressed	3.04 (1.074)	3.22 (1.312)	-0.18 (-0.635, 0.274)	-0.785	0.434
I feel angry	3 (1.174)	2.82 (1.383)	0.184 (-0.3, 0.668)	0.754	0.453
My life is very good	3.3 (1.093)	3.33 (1.088)	-0.025 (-0.428, 0.378)	-0.121	0.904
I can do daily routines	2.5 (1.329)	2.79 (1.32)	-0.289 (-0.779, 0.2)	-1.171	0.244
I'm satisfied about my life right now	2.72 (1.241)	2.92 (1.241)	-0.204 (-0.663, 0.255)	-0.878	0.381
I can accept it as it is	3.33 (1.012)	3.26 (1.159)	0.063 (-0.346, 0.472)	0.305	0.761
I have something important in contributing to the country	3.48 (1.243)	3.61 (1.108)	-0.127 (-0.556, 0.302)	-0.586	0.559
I always involve myself in the community (work around it)	3.35 (1.178)	3.33 (1.025)	0.019 (-0.382, 0.42)	0.093	0.926
I understand what happens	4.26 (0.929)	4.18 (0.89)	0.077 (-0.258, 0.411)	0.453	0.651
I understand the action that is performed is fair	3.83 (1.018)	3.71 (1.273)	0.116 (-0.322, 0.554)	0.522	0.602
I think everyone is good	3.67 (1.034)	3.5 (1.238)	0.174 (-0.257, 0.605)	0.799	0.426

The t-test showed no significant difference between gender groups.

a retrospective analysis of a data set that was collected for operational purposes.

### Comparison of Means

There was no significant difference between the mean scores for all 20 questions, between quarantined and non-quarantined groups (Table 3). In the analysis of the 12 positive scoring items, the raw scores were higher for the quarantined group except for the following three items: (a) "I can do daily routines"; (b) "I understand what happens"; and (c) "I understand the action that is performed is fair." However, there was no statistical difference between both groups as mentioned. For the eight negative scoring items, similarly, all the raw mean scores were higher in the quarantined group, except for "I feel angry" (2.88 vs. 2.89 for non-quarantined group). Again the t-test showed no significant difference between gender groups (Table 4).

As there were four different year groups, ANOVA analysis was performed (Table 5). There were statistically significant differences between year groups for three of the questions: (a) "I understand what happens"; (b) "I understand the action that is performed is fair"; and (c) "I think everyone is good." Bonferroni correction and the differences between the groups were no longer significant except in between Post-graduate and Year 3 students for "I think everyone is good" (Table 6).

### Multiple Regression

No significant difference was encountered after hierarchical multiple regression.

## DISCUSSION

One of the main purposes of performing the initial operational study was to assess whether the efforts to provide a pleasant quarantine experience, both infrastructural and psychologically, were sufficient. From the results, it appears that there is no statistically significant difference in all psychological indices measured between quarantined and non-quarantined groups. Pandemics are known to affect more than the physical health of the population; there are also mental health sequelae secondary to poor physical health. Therefore, it is important to maintain good physical health. Before COVID-19, individuals can focus freely on their exercise and physical activity to maintain healthy lifestyles. However, during the Covid-19 pandemic, this is significantly reduced especially for those with underlying chronic illness (12). The total energy expenditure and physical activity are significantly reduced may be due to containment and quarantine. This is due to lack of equipment, lack of large spaces, and absence of personal trainers. This in turn may cause short- and long-term health issues especially involving cardiorespiratory health and may contribute to difficulties coping with stress and anxiety during the COVID-19 pandemic (3, 10, 13). Effective strategies on promoting physical activity and exercise, hence, should be considered and implemented by either developing new or utilizing and modifying existing programs with reference to particular standard operating procedures (SOP).

It is prudent for health authorities to ensure adequate, clear-cut, and strong bases for quarantine (14). Many factors, however, determine individuals' compliance to quarantine measures.

**TABLE 5 |** Questionnaire analysis between the year groups.

Item	Year	Mean (SD)	F-statistic (df = 3,118)	P-value
I feel safe	Year 1	4.31 (0.788)	1.441	0.234
	Year 2	4.1 (0.982)		
	Year 3	3.9 (1.229)		
	Postgraduate	4.57 (0.535)		
I feel happy	Year 1	2.85 (1.047)	1.288	0.282
	Year 2	3 (1.109)		
	Year 3	2.55 (1.339)		
	Postgraduate	3.14 (1.069)		
I feel appreciated and protected	Year 1	3.73 (1.079)	2.306	0.08
	Year 2	4.08 (0.888)		
	Year 3	3.51 (1.244)		
	Postgraduate	4.14 (0.69)		
I feel lonely	Year 1	1.238 (0.243)	0.235	0.872
	Year 2	1.198 (0.189)		
	Year 3	1.135 (0.162)		
	Postgraduate	0.9 (0.34)		
I feel negative	Year 1	2.92 (1.129)	0.241	0.867
	Year 2	2.98 (1.187)		
	Year 3	3.14 (1.258)		
	Postgraduate	3 (1.155)		
I feel sad	Year 1	3.62 (1.235)	1.485	0.222
	Year 2	2.98 (1.25)		
	Year 3	3.37 (1.302)		
	Postgraduate	3.14 (1.215)		
I feel disappointed	Year 1	3.23 (1.142)	0.87	0.459
	Year 2	3 (1.177)		
	Year 3	3.27 (1.303)		
	Postgraduate	2.57 (1.512)		
I feel moody	Year 1	3.23 (1.032)	0.27	0.847
	Year 2	2.95 (1.218)		
	Year 3	3.02 (1.377)		
	Postgraduate	3 (1.528)		
I'm feeling worried	Year 1	3.65 (0.892)	1.865	0.139
	Year 2	3.15 (1.292)		
	Year 3	2.96 (1.306)		
	Postgraduate	3 (1.414)		
I'm feeling depressed	Year 1	3.42 (1.137)	0.749	0.525
	Year 2	3.1 (1.194)		
	Year 3	3.12 (1.301)		
	Postgraduate	2.71 (1.254)		
I feel angry	Year 1	3.04 (1.248)	3.495	0.018
	Year 2	2.58 (1.174)		
	Year 3	3.2 (1.369)		
	Postgraduate	1.86 (1.069)		
My life is very good	Year 1	3.38 (1.134)	0.58	0.629
	Year 2	3.45 (1.011)		
	Year 3	3.16 (1.124)		
	Postgraduate	3.43 (1.134)		
I can do daily routines	Year 1	2.27 (0.962)	2.548	0.059
	Year 2	2.93 (1.403)		

(Continued)



**TABLE 5 |** Continued

Item	Year	Mean (SD)	F-statistic (df = 3,118)	P-value
I'm satisfied about my life right now	Year 3	2.57 (1.399)	1.413	0.243
	Postgraduate	3.57 (0.976)		
	Year 1	2.62 (1.267)		
	Year 2	3.1 (1.236)		
I can accept it as it is	Year 3	2.69 (1.245)	1.827	0.146
	Postgraduate	3.29 (0.951)		
	Year 1	3.27 (1.116)		
	Year 2	3.53 (0.96)		
I have something important in contributing to the country	Year 3	3.04 (1.19)	1.057	0.37
	Postgraduate	3.71 (0.951)		
	Year 1	3.69 (0.97)		
	Year 2	3.75 (1.193)		
I always involve myself in the community (work around it)	Year 3	3.35 (1.267)	0.135	0.939
	Postgraduate	3.43 (0.535)		
	Year 1	3.23 (0.992)		
	Year 2	3.33 (0.997)		
I understand what happens	Year 3	3.39 (1.255)	2.975	0.034
	Postgraduate	3.43 (0.535)		
	Year 1	4.08 (0.977)		
	Year 2	4.53 (0.679)		
I understand the action that is performed is fair	Year 3	4 (1)	2.681	0.05
	Postgraduate	4.43 (0.535)		
	Year 1	3.69 (1.225)		
	Year 2	4.08 (0.971)		
I think everyone is good	Year 3	3.45 (1.292)	4.104	0.008
	Postgraduate	4.29 (0.756)		
	Year 1	3.54 (1.14)		
	Year 2	3.83 (1.107)		
	Year 3	3.22 (1.177)		
	Postgraduate	4.57 (0.535)		

There were statistically significant differences between year groups for questions "I understand what Happens," "I understand the action that is performed is fair," and "I think everyone is good".

These factors are largely classified into duration of quarantine and motivation to comply (15). In this sense, two questions in this operational study actually measure the latter: "I have something important in contributing to the country" and "I always involve myself in the community."

However, in this study, it was shown that not only did individuals comply to quarantine measures, but on raw scales of psychological wellness, their scores were statistically similar to those out of quarantine. No doubt these results could have come due to the small sample size ( $n = 14$ ) of the quarantined group. However, as this is an analysis of an operational study, and the entire quarantined group was captured in this study, there is no justifiable ethics basis in artificially quarantining more individuals to have statistically significant results, so this is a research limitation of the study.

Looking from another angle, it is arguable that the individuals in quarantine were given an experience virtually identical to those not under quarantine. They were all housed in double-story houses with living rooms and front yards, and food,

provisions and sanitary items were delivered to their doorstep on demand. Hence, physically, they may have even been more well off compared to those out of quarantine, who had to use their own money to purchase food and provisions, as they did not have any physical restrictions. Financial restrictions are a known factor for university student stress (15). Hence, this study demonstrates that it is crucial that quarantine facilities are made as indistinguishable as possible from normal life to ensure no difference, be it statistically or operationally, in psychological wellness between quarantine and non-quarantine individuals.

Psychologically, there is of course anxiety from being under investigation due to contact with COVID-19 individuals, and quarantine measures may actually have alleviated their anxiety more than standard home quarantine outside. They may also be afraid of being infected during the quarantine period, which is possible (16). In crisis, isolation is a big factor for individuals to psychologically decompensate. Conversely, in the agricultural campus, the students who were quarantined were allowed to live together in reasonably luxurious facilities. This would have

**TABLE 6 |** Questionnaire analysis between the year groups.

Items	(I) Year	(J) Year	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval	
						Lower bound	Upper bound
I feel safe	Year 1	Year 2	0.208	0.262	1	-0.49	0.91
		Year 3	0.41	0.252	0.64	-0.27	1.09
		Postgraduate	-0.264	0.442	1	-1.45	0.92
	Year 2	Year 1	-0.208	0.262	1	-0.91	0.49
		Year 3	0.202	0.221	1	-0.39	0.8
		Postgraduate	-0.471	0.426	1	-1.61	0.67
	Year 3	Year 1	-0.41	0.252	0.64	-1.09	0.27
		Year 2	-0.202	0.221	1	-0.8	0.39
		Postgraduate	-0.673	0.42	0.668	-1.8	0.45
I feel happy	Postgraduate	Year 1	0.264	0.442	1	-0.92	1.45
		Year 2	0.471	0.426	1	-0.67	1.61
		Year 3	0.673	0.42	0.668	-0.45	1.8
	Year 1	Year 2	-0.154	0.301	1	-0.96	0.65
		Year 3	0.295	0.29	1	-0.48	1.07
		Postgraduate	-0.297	0.509	1	-1.66	1.07
	Year 2	Year 1	0.154	0.301	1	-0.65	0.96
		Year 3	0.449	0.255	0.482	-0.23	1.13
		Postgraduate	-0.143	0.489	1	-1.46	1.17
Year 3	Year 1	-0.295	0.29	1	-1.07	0.48	
	Year 2	-0.449	0.255	0.482	-1.13	0.23	
	Postgraduate	-0.592	0.483	1	-1.89	0.7	
I feel appreciated and protected	Postgraduate	Year 1	0.297	0.509	1	-1.07	1.66
		Year 2	0.143	0.489	1	-1.17	1.46
		Year 3	0.592	0.483	1	-0.7	1.89
	Year 1	Year 2	-0.344	0.271	1	-1.07	0.38
		Year 3	0.221	0.261	1	-0.48	0.92
		Postgraduate	-0.412	0.459	1	1.64	0.82
	Year 2	Year 1	0.344	0.271	1	-0.38	1.07
		Year 3	0.565	0.23	0.092	-0.05	1.18
		Postgraduate	-0.068	0.441	1	-1.25	1.12
Year 3	Year 1	-0.221	0.261	1	-0.92	0.48	
	Year 2	-0.565	0.23	0.092	-1.18	0.05	
	Postgraduate	-0.633	0.435	0.893	-1.8	0.54	
I feel lonely	Postgraduate	Year 1	0.412	0.459	1	-0.82	1.64
		Year 2	0.068	0.441	1	-1.12	1.25
		Year 3	0.633	0.435	0.893	-0.54	1.8
	Year 1	Year 2	0.102	0.294	1	-0.69	0.89
		Year 3	-0.015	0.283	1	-0.78	0.75
		Postgraduate	-0.28	0.497	1	-1.61	1.05
	Year 2	Year 1	-0.102	0.294	1	-0.89	0.69
		Year 3	-0.117	0.249	1	-0.78	0.55
		Postgraduate	-0.382	0.479	1	-1.67	0.9
Year 3	Year 1	0.015	0.283	1	-0.75	0.78	
	Year 2	0.117	0.249	1	-0.55	0.78	
	Postgraduate	-0.265	0.472	1	-1.53	1	
Postgraduate	Year 1	0.28	0.497	1	-1.05	1.61	
	Year 2	0.382	0.479	1	-0.9	1.67	
	Year 3	0.265	0.472	1	-1	1.53	
		Year 2	-0.052	0.303	1	-0.87	0.76

(Continued)

**TABLE 6 |** Continued

Items	(I) Year	(J) Year	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval		
						Lower bound	Upper bound	
I feel negative	Year 1	Year 3	-0.22	0.292	1	-1	0.56	
		Postgraduate	-0.077	0.512	1	-1.45	1.3	
	Year 2	Year 1	0.052	0.303	1	-0.76	0.87	
		Year 3	-0.168	0.256	1	-0.86	0.52	
	Year 3	Postgraduate	-0.025	0.493	1	-1.35	1.3	
		Year 1	0.22	0.292	1	-0.56	1	
	Postgraduate	Year 2	0.168	0.256	1	-0.52	0.86	
		Postgraduate	0.143	0.486	1	-1.16	1.45	
	I feel sad	Year 1	Year 1	0.077	0.512	1	-1.3	1.45
			Year 2	0.025	0.493	1	-1.3	1.35
		Year 2	Year 3	-0.143	0.486	1	-1.45	1.16
			Postgraduate	0.64	0.319	0.282	-0.22	1.5
Year 3		Year 3	0.248	0.307	1	-0.58	1.07	
		Postgraduate	0.473	0.539	1	-0.98	1.92	
Postgraduate		Year 1	-0.64	0.319	0.282	-1.5	0.22	
		Year 2	Year 3	-0.392	0.27	0.893	-1.12	0.33
I feel happy		Year 1	Postgraduate	-0.168	0.519	1	-1.56	1.22
			Year 1	-0.248	0.307	1	-1.07	0.58
		Year 2	Year 2	0.392	0.27	0.893	-0.33	1.12
			Postgraduate	0.224	0.512	1	-1.15	1.6
	Year 3	Year 1	-0.473	0.539	1	-1.92	0.98	
		Postgraduate	Year 2	0.168	0.519	1	-1.22	1.56
	Postgraduate	Year 3	-0.224	0.512	1	-1.6	1.15	
		Year 2	0.231	0.313	1	-0.61	1.07	
	Year 1	Year 3	-0.035	0.301	1	-0.84	0.77	
		Postgraduate	0.659	0.529	1	-0.76	2.08	
	Year 2	Year 1	-0.231	0.313	1	-1.07	0.61	
		Year 3	Year 3	-0.265	0.265	1	-0.98	0.44
Year 3	Postgraduate	0.429	0.509	1	-0.94	1.79		
	Year 1	0.035	0.301	1	-0.77	0.84		
Postgraduate	Year 2	0.265	0.265	1	-0.44	0.98		
	Postgraduate	0.694	0.502	1	-0.65	2.04		
Year 1	Year 1	-0.659	0.529	1	-2.08	0.76		
	Year 2	Year 2	-0.429	0.509	1	-1.79	0.94	
Year 2	Year 3	-0.694	0.502	1	-2.04	0.65		
	Postgraduate	Year 2	0.281	0.319	1	-0.58	1.14	
Year 3	Year 3	0.21	0.307	1	-0.61	1.04		
	Postgraduate	0.231	0.54	1	-1.22	1.68		
Postgraduate	Year 1	-0.281	0.319	1	-1.14	0.58		
	Year 2	Year 3	-0.07	0.27	1	-0.8	0.65	
Year 1	Postgraduate	-0.05	0.519	1	-1.44	1.34		
	Year 1	-0.21	0.307	1	-1.04	0.61		
Year 2	Year 2	0.07	0.27	1	-0.65	0.8		
	Postgraduate	0.02	0.512	1	1.35	1.39		
Year 3	Year 1	-0.231	0.54	1	-1.68	1.22		
	Postgraduate	Year 2	0.05	0.519	1	-1.34	1.44	
Postgraduate	Year 3	-0.02	0.512	1	-1.39	1.35		
	Year 2	0.504	0.31	0.642	-0.33	1.34		

(Continued)

**TABLE 6 |** Continued

Items	(I) Year	(J) Year	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval	
						Lower bound	Upper bound
I'm feeling depressed	Year 1	Year 3	0.695	0.299	0.131	-0.11	1.5
		Postgraduate	0.654	0.524	1	-0.75	2.06
	Year 2	Year 1	-0.504	0.31	0.642	-1.34	0.33
		Year 3	0.191	0.262	1	-0.51	0.89
	Year 3	Postgraduate	0.15	0.504	1	1.2	1.5
		Year 1	-0.695	0.299	0.131	-1.5	0.11
	Postgraduate	Year 2	-0.191	0.262	1	-0.89	0.51
		Year 3	-0.041	0.498	1	-1.38	1.29
	Year 1	Year 2	-0.654	0.524	1	-2.06	0.75
		Year 3	-0.15	0.504	1	-1.5	1.2
	Year 2	Year 3	0.041	0.498	1	-1.29	1.38
		Postgraduate	0.323	0.31	1	-0.51	1.15
	Year 3	Year 2	0.301	0.299	1	-0.5	1.1
		Postgraduate	0.709	0.524	1	-0.7	2.11
	Year 1	Year 1	-0.323	0.31	1	-1.15	0.51
		Year 3	-0.022	0.262	1	-0.73	0.68
	Year 2	Postgraduate	0.386	0.504	1	-0.97	1.74
		Year 1	-0.301	0.299	1	-1.1	0.5
	Year 3	Year 2	0.022	0.262	1	-0.68	0.73
		Postgraduate	0.408	0.497	1	0.93	1.74
	Postgraduate	Year 1	-0.709	0.524	1	-2.11	0.7
		Year 2	-0.386	0.504	1	-1.74	0.97
	Year 1	Year 3	-0.408	0.497	1	-1.74	0.93
		Postgraduate	0.463	0.319	0.896	-0.39	1.32
Year 2	Year 3	-0.166	0.308	1	-0.99	0.66	
	Postgraduate	1.181	0.54	0.183	-0.27	2.63	
Year 3	Year 1	-0.463	0.319	0.896	-1.32	0.39	
	Postgraduate	-0.629	0.27	0.129	-1.35	0.1	
I feel angry	Year 1	Year 3	0.718	0.519	1	-0.68	2.11
	Postgraduate	0.166	0.308	1	-0.66	0.99	
Year 2	Year 3	0.629	0.27	0.129	-0.1	1.35	
	Postgraduate	1.347	0.512	0.058	-0.03	2.72	
Year 3	Year 1	-1.181	0.54	0.183	-2.63	0.27	
	Postgraduate	-0.718	0.519	1	-2.11	0.68	
Postgraduate	Year 3	-1.347	0.512	0.058	-2.72	0.03	
	Year 2	-0.065	0.275	1	-0.8	0.67	
Year 1	Year 3	0.221	0.265	1	-0.49	0.93	
	Postgraduate	-0.044	0.465	1	-1.29	1.2	
Year 2	Year 1	0.065	0.275	1	-0.67	0.8	
	Year 3	0.287	0.232	1	-0.34	0.91	
My life is very good	Postgraduate	0.021	0.447	1	-1.18	1.22	
	Year 1	-0.221	0.265	1	-0.93	0.49	
Year 3	Year 2	-0.287	0.232	1	-0.91	0.34	
	Postgraduate	-0.265	0.441	1	-1.45	0.92	
Postgraduate	Year 1	0.044	0.465	1	-1.2	1.29	
	Year 2	-0.021	0.447	1	-1.22	1.18	
I can do daily routines	Year 3	0.265	0.441	1	-0.92	1.45	
	Year 2	-0.656	0.328	0.286	-1.53	0.22	
Year 1	Year 3	-0.302	0.316	1	1.15	0.54	

(Continued)



**TABLE 6 |** Continued

Items	(I) Year	(J) Year	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval		
						Lower bound	Upper bound	
I'm satisfied about my life right now	Year 2	Postgraduate	-1.302	0.554	0.122	-2.79	0.18	
		Year 1	0.656	0.328	0.286	-0.22	1.53	
		Year 3	0.354	0.277	1	-0.39	1.1	
	Year 3	Postgraduate	-0.646	0.533	1	-2.08	0.78	
		Year 1	0.302	0.316	1	-0.54	1.15	
		Year 2	-0.354	0.277	1	-1.1	0.39	
	Postgraduate	Postgraduate	-1	0.526	0.357	-2.41	0.41	
		Year 1	1.302	0.554	0.122	-0.18	2.79	
		Year 2	0.646	0.533	1	-0.78	2.08	
	Year 1	Year 3	1	0.526	0.357	-0.41	2.41	
		Year 2	-0.485	0.311	0.73	-1.32	0.35	
		Year 3	-0.078	0.299	1	-0.88	0.72	
	I can accept it as it is	Year 2	Postgraduate	-0.67	0.525	1	2.08	0.74
			Year 1	0.485	0.311	0.73	-0.35	1.32
			Year 3	0.406	0.263	0.75	-0.3	1.11
		Year 3	Postgraduate	-0.186	0.505	1	-1.54	1.17
			Year 1	0.078	0.299	1	-0.72	0.88
			Year 2	-0.406	0.263	0.75	-1.11	0.3
		Postgraduate	Postgraduate	-0.592	0.498	1	-1.93	0.75
			Year 1	0.67	0.525	1	0.74	2.08
Year 2			0.186	0.505	1	1.54	1.54	
Year 1		Year 3	0.592	0.498	1	-0.75	1.93	
	Year 2	-0.256	0.275	1	-0.99	0.48		
	Year 3	0.228	0.265	1	-0.48	0.94		
Year 2	Postgraduate	-0.445	0.465	1	-1.69	0.8		
	Year 1	0.256	0.275	1	-0.48	0.99		
	Year 3	0.484	0.232	0.237	-0.14	1.11		
Year 3	Postgraduate	-0.189	0.447	1	-1.39	1.01		
	Year 1	-0.228	0.265	1	-0.94	0.48		
	Year 2	-0.484	0.232	0.237	-1.11	0.14		
Postgraduate	Postgraduate	-0.673	0.441	0.775	-1.86	0.51		
	Year 1	0.445	0.465	1	-0.8	1.69		
	Year 2	0.189	0.447	1	-1.01	1.39		
Year 1	Year 3	0.673	0.441	0.775	-0.51	1.86		
	Year 2	-0.058	0.291	1	-0.84	0.72		
	Year 3	0.345	0.281	1	-0.41	1.1		
I have something important in contributing to the country	Year 2	Postgraduate	0.264	0.493	1	-1.06	1.59	
		Year 1	0.058	0.291	1	-0.72	0.84	
		Year 3	0.403	0.246	0.628	-0.26	1.06	
Year 3	Postgraduate	0.321	0.474	1	-0.95	1.59		
	Year 1	-0.345	0.281	1	-1.1	0.41		
	Year 2	-0.403	0.246	0.628	-1.06	0.26		
Postgraduate	Postgraduate	-0.082	0.467	1	-1.34	1.17		
	Year 1	-0.264	0.493	1	-1.59	1.06		
	Year 2	-0.321	0.474	1	-1.59	0.95		
Year 1	Year 3	0.082	0.467	1	-1.17	1.34		
	Year 2	-0.094	0.275	1	-0.83	0.64		
	Year 3	-0.157	0.265	1	-0.87	0.55		
I always involve myself in the community (work around it)	Year 1	Postgraduate	-0.198	0.465	1	-1.45	1.05	

(Continued)

**TABLE 6 |** Continued

Items	(I) Year	(J) Year	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval	
						Lower bound	Upper bound
I understand what happens	Year 2	Year 1	0.094	0.275	1	-0.64	0.83
		Year 3	-0.063	0.233	1	-0.69	0.56
		Postgraduate	-0.104	0.447	1	-1.3	1.1
	Year 3	Year 1	0.157	0.265	1	-0.55	0.87
		Year 2	0.063	0.233	1	-0.56	0.69
		Postgraduate	-0.041	0.441	1	-1.22	1.14
	Postgraduate	Year 1	0.198	0.465	1	-1.05	1.45
		Year 2	0.104	0.447	1	-1.1	1.3
		Year 3	0.041	0.441	1	-1.14	1.22
	Year 1	Year 2	-0.448	0.222	0.274	-1.04	0.15
		Year 3	0.077	0.214	1	-0.5	0.65
		Postgraduate	-0.352	0.375	1	-1.36	0.65
	Year 2	Year 1	0.448	0.222	0.274	-0.15	1.04
		Year 3	0.525*	0.188	0.036	0.02	1.03
		Postgraduate	0.096	0.361	1	-0.87	1.06
	Year 3	Year 1	-0.077	0.214	1	-0.65	0.5
		Year 2	-0.525*	0.188	0.036	-1.03	-0.02
		Postgraduate	-0.429	0.356	1	-1.38	0.53
	Postgraduate	Year 1	0.352	0.375	1	-0.65	1.36
		Year 2	-0.096	0.361	1	-1.06	0.87
		Year 3	0.429	0.356	1	-0.53	1.38
Year 1	Year 2	-0.383	0.291	1	-1.16	0.4	
	Year 3	0.243	0.281	1	-0.51	1	
	Postgraduate	-0.593	0.493	1	-1.92	0.73	
I understand the action that is performed is fair	Year 2	Year 1	0.383	0.291	1	-0.4	1.16
		Year 3	0.626	0.246	0.074	-0.04	1.29
		Postgraduate	-0.211	0.474	1	-1.48	1.06
Year 3	Year 1	-0.243	0.281	1	-1	0.51	
	Year 2	-0.626	0.246	0.074	-1.29	0.04	
	Postgraduate	-0.837	0.467	0.456	-2.09	0.42	
Postgraduate	Year 1	0.593	0.493	1	-0.73	1.92	
	Year 2	0.211	0.474	1	-1.06	1.48	
	Year 3	0.837	0.467	0.456	-0.42	2.09	
I think everyone is good	Year 1	Year 2	-0.287	0.283	1	-1.04	0.47
		Year 3	0.314	0.272	1	-0.42	1.04
		Postgraduate	-1.033	0.478	0.196	-2.31	0.25
	Year 2	Year 1	0.287	0.283	1	-0.47	1.04
		Year 3	0.601	0.239	0.08	-0.04	1.24
		Postgraduate	-0.746	0.46	0.642	-1.98	0.49
	Year 3	Year 1	-0.314	0.272	1	-1.04	0.42
		Year 2	-0.601	0.239	0.08	-1.24	0.04
		Postgraduate	-1.347*	0.453	0.022	-2.56	-0.13
	Postgraduate	Year 1	1.033	0.478	0.196	-0.25	2.31
		Year 2	0.746	0.46	0.642	-0.49	1.98
		Year 3	1.347*	0.453	0.022	0.13	2.56

Bonferroni correction and the differences between the groups were no longer significant except in between Post-graduate and Year 3 students for "I think everyone is good".

\*The mean difference is significant at the 0.05 level.

provided the necessary peer support, sharing of lived experience as COVID-19 people under surveillance or investigation, which

they could not have had face to face if they had been home quarantined in their respective rooms at home. Hence there is

actually a sense of collective support that came out of being lodged in the quarantine center, which would have blunted the higher levels of anxiety from being suspected of being infected with COVID-19 (17). The duration of quarantine, otherwise, will increase problems in mental health, especially Post Traumatic Stress Disorder (PTSD) (18).

In comparison with their peers outside in MCO, they would have to stay in their own rooms, and be confined to their own four walls and subsist on virtual connections to talk to other individuals, as mass gatherings were strictly prohibited during the MCO. Hence, under these circumstances of collective restriction of movement, it would stand to reason that being quarantined formally is not actually as distressing or restrictive as it would be in peacetime. Moreover, quarantined individuals were given access to tele counseling services, who adopted groups of five students for individual consultations. Hence the provision of psychological services is also very crucial to reduce psychological distress in quarantine (17).

No doubt, there are other potential more insidious sequelae of quarantine or isolation that can sometimes occur. It is human nature that individuals may develop malingering or factitious disorder to expedite escape. Factitious disorder itself is sometimes difficult to diagnosed and sometimes may co-exist with true medical problems (19). From a statistical point of view, this poses a potential major research limitation, this may overestimate the presence of psychological distress in a quarantined or movement-restricted population. However, in this operational study, the focus was on comparing levels of wellness or distress rather than measuring psychological parameters against established cut-off points, as the instrument adapted did not have validated cut-off points. Qualitatively, rumor surveillance performed by doctors on the ground suggested that there was no increase in diagnosable mental disorders, as a walk-in psychiatry service was provided and tele counseling was offered to all quarantined individuals as secondary prevention.

Malingering, however is more related to background history of mental health issues or childhood health conditions (19). The other parallel situation to quarantine is that of being imprisoned; however, it is rare for quarantined or isolated individuals to develop borderline personality traits as compared to prisoners. This difference in prison settings may be due to other associated factors such as torture, personality of residents, hygiene, conduciveness, and others.

On the other hand, if malingering of psychiatric illness is present, it needs to be interpreted and judged very meticulously. Patients' symptoms need correlation with the risk factors and other history as per the standards of that illness. These subjective symptoms then require correlation with physical signs. Then further diagnoses can be established with adjunct investigations. For example, common clinical condition such as acute appendicitis, may even be missed following poor clinical judgement and an overly high index of suspicion of factitious illness (20). A diagnosis of a true psychiatric disorder needs to be performed after thorough exclusion of organic or biological disorders, as per practice within or without times of quarantine or movement restriction.

Such prolonged quarantine can no doubt result in increased fears of Covid-19 (21, 22), and have been associated with depression, anxiety, and stress in similar populations (23–25). Hence, it is crucial that early preventative measures at the university level be undertaken to increase surveillance at the alert phase (26, 27), especially taking into account the impact of digital learning on student burnout and mental health (28). Crucially, brief psychological interventions also need to be undertaken to reduce psychological morbidity, especially in rural areas (29, 30). Digital interventions can also be employed to expedite monitoring of quarantine and streamline surveillance to reduce unnecessary healthcare worker man-hours (31). However, digital tools must be judiciously used, as there is burgeoning evidence that social media itself can contribute to misinformation which can complicate the psychological health of the young people involved in the aforementioned quarantine, underpinning the importance of accurate and correctly pitched health risk communication (32). Lastly, it is imperative that culturally sensitive tools be employed to measure psychological distress to ensure accurate capture of psychopathology (33, 34).

A major limitation of the study is that we were not able to select a specific target of respondents, but rather considered any student on campus that complied with the three generic inclusion criteria, thus curtailing the generalisability of the findings. Due to the abrupt lockdown enforced by governments without warning, we were highly limited by what kind of respondents we could recruit. Hence, we had to opportunistically employ the undergraduate students who were suddenly locked down, which gave us real time data into the negative sequel of such abrupt measures. Though we were not able to include other individuals outside the campus to create a more homogenous sample, the respondents we were able to access in this time of great chaos and uncertainty gave us a valuable snapshot of the acute psychological states of acutely quarantined students at a historical moment in the time of the pandemic.

## CONCLUSION

Movement control orders or compulsory quarantine orders can be distressing and may cause understandable psychological sequelae. However, times of stress can also be a period of growth, and it is incumbent upon quarantining parties to ensure that the distress caused by both physical quarantining and the psychological effect of worries and fears regarding being suspected of having COVID-19 or being in contact with someone with COVID-19 is balanced out judiciously with both reasonable and comfortable physical amenities, telecommunications support, and psychological support. This paper demonstrates that in an agricultural campus in Borneo, on gross measures of psychological wellness covering both positive and negative items, there was no statistical difference between a quarantined and non-quarantined group. This reinforces the need to quarantine judiciously and quarantine well, under luxurious and privileged conditions, with ample amenities and life necessities. When properly done, quarantining facilities can

be a place of positivity, allowing people to live a shared experience together, provide peer support for each other, and give each other hope.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

Permission to conduct the retrospective analysis was obtained from the Medical Ethics Committee of University Malaysia Sabah. Students of the agricultural campus were approached by the operational team to take part in the questionnaire and provided written informed consent for participation.

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## AUTHOR CONTRIBUTIONS

AM: data collection and discussion. NP: materials and method and discussion. LS: abstract, introduction, and discussion. SR and AO: commenter. MJ: supervisor. All authors contributed to the article and approved the submitted version.

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# Coping Strategies in the Spanish Population: The Role in Consequences of COVID-19 on Mental Health

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The worldwide health emergency caused by COVID-19 is a new challenge for humanity which individuals respond to in a diversity of ways. The type of coping people use in such a situation could lead to positive or negative consequences to their health. Our objective was to analyze the use of coping strategies in the general population with attention to sociodemographic variables, and to test the capacity of these strategies for mediating in repercussions on mental health. The 1,160 adults who participated in this study answered the Cognitive Emotion Regulation Questionnaire (CERQ-S) and General Health Questionnaire (GHQ-28). The data were collected in a CAWI (Computer Aided Web Interviewing). The results suggest that the coping strategies they used the most differed depending on sociodemographic characteristics, such as age, sex and education. Furthermore, two mediation models were estimated for positive and negative coping strategies in the relationship between the presence of COVID-19 near them and mental health. The “negative” coping strategies were found to exert an indirect effect as mediators in the impact that COVID-19 positive cases near them had on their health. The consequences to mental health of the impact of coping with adverse situations should not be underestimated and it is important to design programs to educate the population in coping strategies that promote their health.

**Keywords:** coping, health, COVID-19, adult population, well-being

## INTRODUCTION

COVID-19 has led to a worldwide health crisis without precedent. The World Health Organization (WHO) declared it a global emergency on January 30, 2020 (1). Beyond the tensions inherent to the disease itself, the governmental instructions on mass home confinement are a new situation for the Spanish population and generate concern for how people will react, and the repercussions on their mental health this could lead to. A recent review on psychological effects in samples of people in quarantine revealed associated confusion, boredom, insomnia, stress, irritability and depression, some of which continued after it was over (2). Another study by Pérez-Fuentes et al. (3) in an adult Spanish population showed that confinement brought negative consequences to their well-being and negative affect increased both perception of threat from COVID-19 and negative

mood, which in turn, increased somatic complaints (4). During the pandemic, health problems were more frequent in young people and singles (5, 6).

During adverse situations threatening well-being, such as the COVID-19 pandemic we are now going through, people use their psychological resources to cope with the situation, developing different styles and strategies. Coping can be considered an effort to reduce or eliminate the negative effects of stress on one's well-being (7). Studies have demonstrated that effective coping strategies can protect people from mental illness when faced with adverse situations (5, 8–10). And the opposite is observed with maladaptive coping strategies, which influence their mental health predisposing them to alterations such as depression and anxiety (6, 11–15), so repercussions on well-being depend on the type of coping used (3, 16).

Based on the Threats and Coping Appraisal Theory (17), it may be said that individuals who are exposed to stressful situations respond with adaptive behavior, which provide them with immediate and long-term well-being, or with maladaptive coping, which distracts or alleviates them, making them feel better temporarily, but generating psychological distress later. However, it is not clear how some coping strategies behave in this relationship with health. Adaptive strategies such as positive reevaluation and refocusing in particular do not seem to have a continued effect over time (18, 19).

The gender perspective should not be forgotten. Coping styles can differ by gender. Women use more emotional coping strategies, such as social support, which could prevent depression (20–23). And men use self-distraction and self-blame more than women (22). One of our hypotheses was therefore the presence of differences in coping strategies between men and women in a context of threat from COVID-19. It has also been confirmed that young women caregivers are the group showing the highest stress levels (22) and those who perceive strong threat from COVID-19 (24). Age is a variable which also seems to influence the choice of coping strategies (22, 25, 26) as does education (24). However, no differences in the use of coping strategies by education level were found in the study by Amazue and Onyishi (27). Therefore, the second hypothesis posed is the existence of differences in coping strategies used by age and education.

Another hypothesis tested was the existence of differences in mental health based on coping style used. The use of cognitive and prosocial behaviors was associated with fewer mental health problems (9). Other variables that could be influencing people's well-being is the existence of positive cases of SARS-CoV-2 near them or staying in places where there has been a high incidence of the disease (6, 9). Therefore, it was expected that having someone nearby diagnosed with COVID-19 would affect their mental health, with coping strategies mediating in this relationship.

The main objective of this study was to analyze the use of coping strategies in the general population with attention to sociodemographic variables, and to test the capacity of these strategies to mediate in the repercussion on their mental health.

## MATERIALS AND METHODS

### Participants

A total of 1,688 adults originally filled in the survey. After a first review, 528 cases were eliminated from the sample either because the survey was incomplete, or because incoherent or random answers were identified.

The final sample was made up of 1,160 adults residing in Spain, with a mean age of 38.29 (SD = 13.71) in a range of 18–82. Of the whole sample, 30.1% ( $n = 349$ ) were men and 69.9% ( $n = 811$ ) women, with a mean of 41.16 (SD = 14.13) and 37.05 (SD = 13.34), respectively. Of these, 47% ( $n = 545$ ) were single and 53% ( $n = 615$ ) were not.

Apart from the above, and in regard to COVID-19, participants were asked whether they had any positive cases near them. The answer of 31% ( $n = 360$ ) of the participants was positive.

### Instruments

The following instruments were used to collect the data:

An *ad hoc* questionnaire was used for collecting sociodemographic characteristics. Items were included for sex, age, marital status and whether anyone near them was COVID-19 positive.

*Cognitive Emotion Regulation Questionnaire* (CERQ) (28), Spanish version (CERQ-S) (29). This consists of 36 items answered on a five-point Likert type scale (from 1 = almost never, to 5 = almost always). It evaluates nine cognitive strategies for coping with negative situations. Reliability found for the sample in this study was: self-blame ( $\omega = 0.71$ ; GLB = 0.73), acceptance ( $\omega = 0.71$ ; GLB = 0.75), rumination ( $\omega = 0.77$ ; GLB = 0.77), positive refocusing ( $\omega = 0.86$ ; GLB = 0.85), planning ( $\omega = 0.80$ ; GLB = 0.82), positive reappraisal ( $\omega = 0.84$ ; GLB = 0.88), putting into perspective ( $\omega = 0.68$ ; GLB = 0.74), catastrophizing ( $\omega = 0.72$ ; GLB = 0.78), and other-blame ( $\omega = 0.90$ ; GLB = 0.91).

*General Health Questionnaire* (GHQ-28) (30), Spanish adaptation validated by Lobo et al. (31). This scale has 28 items with four answer choices which provide information on somatic symptoms, anxiety and insomnia, social dysfunction and depression subscales. Among the scoring methods is a Likert-type scale, where each answer is scored 0–3. The instrument's reliability in our case was  $\omega = 0.93$  and GLB = 0.94 for the whole scale, and for the each of the subscales: somatic symptoms ( $\omega = 0.86$ ; GLB = 0.89), anxiety and insomnia ( $\omega = 0.90$ ; GLB = 0.95), social dysfunction ( $\omega = 0.81$ ; GLB = 0.82) and depression ( $\omega = 0.91$ ; GLB = 0.94).

### Procedure

Data were collected in a CAWI (Computer Aided Web Interviewing) interview after snowball sampling, specifically from 1 to 12 May 2020. Participation was voluntary and before starting to answer the questionnaire, on a first page, relevant information on the study and its purpose was provided. The participants gave their informed consent by marking a box for the purpose, which then allowed them to continue with the questionnaire. They were asked to answer sincerely, and were guaranteed the anonymity of their answers.

Random or incongruent answers were detected by control questions inserted throughout the questionnaire. This study was approved by the University of Almeria Bioethics Committee (Ref. UALBIO2020/032).

## Data Analysis

The McDonald's Omega coefficient was estimated to examine the reliability of the instruments, following Ventura-León and Caycho (32). The Greatest Lower Bound (GLB) was also calculated.

Then, the *t*-test for independent samples was applied to examine the differences between groups (age, sex, marital status, education, anyone COVID-19 positive nearby) with regard to coping strategies, and Cohen's *d* (33) was used to quantify the effect size. A Pearson's coefficient correlation analysis was performed to test the relationships between the variables, and the descriptive statistics were calculated.

Finally, the various mediation analyses were performed, taking presence of a COVID-19 positive case nearby as the predictor, and coping strategy mediators, and as result variables the health subscales (somatic symptoms, anxiety/insomnia, social dysfunction and depression). JASP version 0.11.1 (34) based on lavaan was used for this (35). Bias-corrected percentile bootstrap confidence intervals were applied as suggested by Biesanz et al. (36).

## RESULTS

### Coping Strategies for Threat From COVID-19: Sociodemographic Variables

First, a negative correlation was found between age and rumination ( $r = -0.23$ ;  $p < 0.001$ ; 95% CI  $-0.17, -0.28$ ). Other correlations with age, although less intense, were observed with acceptance ( $r = -0.07$ ;  $p < 0.05$ ; 95% CI  $-0.01, -0.13$ ) and putting into perspective ( $r = -0.07$ ;  $p < 0.05$ ; 95% CI  $-0.01, -0.12$ ). When the age variable was dichotomized, taking the sample mean of about 40 as the reference, differences were found between the under 40 (or young adults) (54.8%,  $n = 636$ ) and over 40 (or mature adults) (45.2%,  $n = 524$ ) age groups. In particular, statistically significant differences were observed in rumination [ $t_{(1,158)} = 6.46$ ,  $p < 0.001$ ,  $d = 0.38$ ].

**Figure 1** shows the results of the comparison of coping strategies by sex. As observed, women scored statistically significantly higher means than men in: acceptance [ $t_{(1,158)} = -2.97$ ,  $p < 0.01$ ,  $d = -0.19$ ], rumination [ $t_{(1,158)} = -4.91$ ,  $p < 0.001$ ,  $d = -0.31$ ], positive refocusing [ $t_{(1,158)} = -3.10$ ,  $p < 0.01$ ,  $d = -0.19$ ], and putting into perspective [ $t_{(1,158)} = -3.06$ ,  $p < 0.01$ ,  $d = -0.19$ ]; while men scored significantly higher in blaming others [ $t_{(1,158)} = 2.91$ ,  $p < 0.01$ ,  $d = 0.18$ ].

By marital status at the time of data collection, differences were found between the groups in rumination [ $t_{(1,158)} = 3.77$ ,  $p < 0.001$ ,  $d = 0.22$ ], where those who did not have a partner scored higher ( $M = 11.88$ ,  $SD = 3.63$ ) than those who had a partner ( $M = 11.08$ ,  $SD = 3.61$ ). No significant differences were observed in the rest of the strategies.

Finally, by education, differences were observed between the primary/secondary education, and higher or university education

groups (**Table 1**). Specifically, differences were found in favor of the group with higher or university studies in the following strategies: rumination, planning, positive reappraisal and putting into perspective. Those with primary/secondary education had significantly higher mean scores in self-blame, catastrophizing and other-blame strategies.

### Coping Strategies and Mental Health

**Table 2** shows the correlation matrix between coping strategies and the GHQ-28 subscales. Some strategies were positively correlated with the presence of health problems. Rumination and catastrophizing in particular, were positively correlated with all the health subscales, while self-blame and other-blame were positively correlated with the presence of somatic symptoms, anxiety/insomnia and depression. Acceptance was positively correlated, although less intensely, with social dysfunction and depression.

However, positive refocusing and positive reappraisal correlated negatively with all the GHQ-28 subscales, putting into perspective was related negatively to anxiety/insomnia, social dysfunction and depression, and planning was negatively correlated with social dysfunction and depression.

### COVID-19 Nearby, Coping and Mental Health: Mediation Models

Two mediation models were proposed. In both cases, the predictor was the presence or not of a positive case of COVID-19 nearby, and as the outcome variables, the four GHQ-28 subscales. Model 1, where the mediating effect of "negative" coping strategies (considered as such based on the positive association with the presence of mental health problems) such as rumination and catastrophizing, was hypothesized. Meanwhile, in Model 2, the existence of a mediating effect was hypothesized for the "positive" coping strategies (considered as such based on the negative association found with presence of mental health problems), which were positive refocusing and reappraisal.

In Model 1 (**Table 3**), a direct effect of positive cases of COVID-19 nearby on the presence of somatic symptoms was observed. As indirect effects, both rumination and catastrophizing mediated in the impact that presence of COVID-19 cases nearby had on health. The total effects were statistically significant for somatic symptoms, anxiety/insomnia and depression.

Model 2 (**Table 4**) showed significant direct effects of the presence of COVID-19 cases nearby on somatic symptoms and anxiety/insomnia. However, this second proposal was not significant for the indirect effects of positive refocusing and reappraisal as mediators in the relationship between the presence of COVID-19 positives nearby and its impact on health. That is, the use of these strategies did not mediate or buffer the relationship between predictor and outcome variables.

## DISCUSSION

As its main objective, this study analyzed the use of coping strategies by the general population, with attention to sociodemographic variables, testing the capacity for mediation



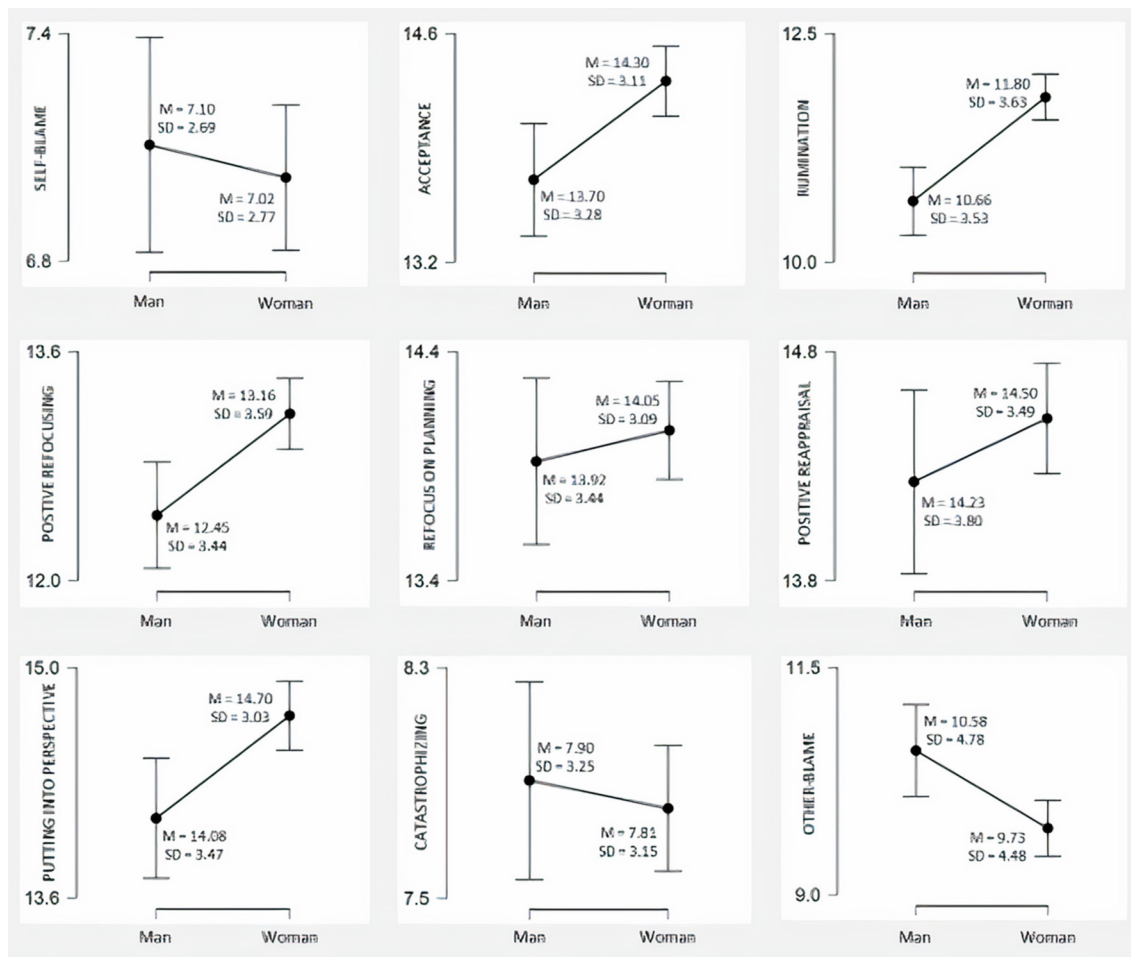


FIGURE 1 | Coping strategies according to sex. Descriptive plots.

TABLE 1 | Coping strategies by education level.

CERQ	Primary/secondary			Higher or University education			t	p	Mean Dif.	SE Dif.	95% CI		Cohen's d
	N	M	SD	N	M	SD					Lower	Upper	
SB	267	7.35	2.86	893	6.95	2.70	2.10	0.036	0.40	0.19	0.02	0.77	0.15
AC	267	13.83	3.33	893	14.21	3.12	-1.68	0.092	-0.37	0.22	-0.80	0.06	-0.12
RU	267	11.03	3.67	893	11.58	3.62	-2.18	0.029	-0.55	0.25	-1.05	-0.05	-0.15
PF	267	12.81	3.63	893	12.99	3.57	-0.69	0.485	-0.17	0.25	-0.66	0.31	-0.05
RP	267	13.58	3.27	893	14.14	3.17	-2.53	0.012	-0.56	0.22	-1.00	-0.12	-0.18
PR	267	13.78	3.77	893	14.61	3.51	-3.32	<0.001	-0.82	0.24	-1.31	-0.34	-0.23
PP	267	14.07	3.19	893	14.65	3.17	-2.60	0.009	-0.57	0.22	-1.01	-0.14	-0.18
CA	267	8.51	3.22	893	7.63	3.14	3.95	<0.001	0.87	0.22	0.44	1.30	0.28
OB	267	10.87	4.73	893	9.72	4.51	3.62	<0.001	1.15	0.31	0.52	1.77	0.25

CERQ\_SB, Self-blame; CERQ\_AC, Acceptance; CERQ\_RU, Rumination; CERQ\_PF, Positive refocusing; CERQ\_RP, Refocus on planning; CERQ\_PR, Positive reappraisal; CERQ\_PP, Putting into perspective; CERQ\_CA, Catastrophizing; CERQ\_OB, Other-blame. Independent samples t-test.

of these strategies in repercussions on mental health. Coping strategies focused on emotion, such as rumination, can be maladaptive, since the attempt to get more information on

the dysphoric mood causes one to think repeatedly about the same thing, without attempting to solve the problem (13). Our results support the first hypothesis posed, since it

**TABLE 2 |** Coping strategies and mental health: Pearson's correlation matrix and descriptive statistics.

		<b>GHQ-SS</b>	<b>GHQ-AI</b>	<b>GHQ-SD</b>	<b>GHQ-D</b>	<b>M (SD)</b>
CERQ_SB	<i>Pearson's r</i>	0.083**	0.107***	0.043	0.201***	7.04 (2.74)
	<i>p – value</i>	0.004	<0.001	0.147	<0.001	
	<i>Upper95%CI</i>	0.140	0.164	0.100	0.256	
	<i>Lower95%CI</i>	0.026	0.050	–0.015	0.145	
CERQ_AC	<i>Pearson's r</i>	0.046	0.054	0.066*	0.087**	14.12 (3.17)
	<i>p – value</i>	0.117	0.065	0.026	0.003	
	<i>Upper95%CI</i>	0.103	0.111	0.123	0.144	
	<i>Lower95%CI</i>	–0.012	–0.003	0.008	0.029	
CERQ_RU	<i>Pearson's r</i>	0.332***	0.438***	0.228***	0.342***	11.46 (3.64)
	<i>p – value</i>	<0.001	<0.001	<0.001	<0.001	
	<i>Upper95%CI</i>	0.383	0.483	0.282	0.392	
	<i>Lower95%CI</i>	0.280	0.390	0.173	0.290	
CERQ_PF	<i>Pearson's r</i>	–0.067*	–0.107***	–0.182***	–0.261***	12.95 (3.58)
	<i>p – value</i>	0.022	<0.001	<0.001	<0.001	
	<i>Upper95%CI</i>	–0.010	–0.050	–0.126	–0.207	
	<i>Lower95%CI</i>	–0.124	–0.164	–0.237	–0.314	
CERQ_RP	<i>Pearson's r</i>	–0.040	–0.026	–0.121***	–0.140***	14.01 (3.20)
	<i>p – value</i>	0.176	0.382	<0.001	<0.001	
	<i>Upper95%CI</i>	0.018	0.032	–0.064	–0.083	
	<i>Lower95%CI</i>	–0.097	–0.083	–0.177	–0.196	
CERQ_PR	<i>Pearson's r</i>	–0.137***	–0.164***	–0.250***	–0.273***	14.42 (3.59)
	<i>p – value</i>	<0.001	<0.001	<0.001	<0.001	
	<i>Upper95%CI</i>	–0.080	–0.108	–0.196	–0.219	
	<i>Lower95%CI</i>	–0.193	–0.220	–0.304	–0.325	
CERQ_PP	<i>Pearson's r</i>	–0.034	–0.068*	–0.061*	–0.105***	14.51 (3.18)
	<i>p – value</i>	0.241	0.020	0.036	<0.001	
	<i>Upper95%CI</i>	0.023	–0.011	–0.004	–0.048	
	<i>Lower95%CI</i>	–0.092	–0.125	–0.119	–0.162	
CERQ_CA	<i>Pearson's r</i>	0.318***	0.428***	0.215***	0.362***	7.84 (3.18)
	<i>p – value</i>	<0.001	<0.001	<0.001	<0.001	
	<i>Upper95%CI</i>	0.369	0.474	0.270	0.411	
	<i>Lower95%CI</i>	0.265	0.380	0.160	0.311	
CERQ_OB	<i>Pearson's r</i>	0.099***	0.124***	0.054	0.100***	9.98 (4.59)
	<i>p – value</i>	<0.001	<0.001	0.064	<0.001	
	<i>Upper95%CI</i>	0.155	0.180	0.112	0.157	
	<i>Lower95%CI</i>	0.041	0.067	–0.003	0.043	
	<i>M(SD)</i>	7.43(4.56)	8.95(5.41)	8.75(3.57)	2.85(4.22)	

CERQ\_SB, Self-blame; CERQ\_AC, Acceptance; CERQ\_RU, Rumination; CERQ\_PF, Positive refocusing; CERQ\_RP, Refocus on planning; CERQ\_PR, Positive reappraisal; CERQ\_PP, Putting into perspective; CERQ\_CA, Catastrophizing; CERQ\_OB, Other-blame. GQ-SS, Somatic symptoms; GHQ-AI, Anxiety/insomnia; GHQ-SD, Social dysfunction; GHQ-D, Depression. \*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .




was observed that maladaptive strategies such as rumination correlated negatively with age and marital status, where young adults and singles were those who most used this coping strategy. A study done in the USA during confinement of the population also found that young adults used less adaptive coping strategies (21).

The results also corroborate our second hypothesis, as men and women used different coping strategies. Women's means were higher in acceptance, rumination, positive refocusing and putting into perspective. And men scored significantly higher other-blame. These results are shared by other authors that

have shown that women use more coping strategies focused on emotion, which could prevent depression, while men use more self-distraction and other-blame (20, 22).




Our results show that people use different coping strategies depending on their level of education as posed in Hypothesis 3. Those with a higher education use more rumination, planning, positive reappraisal and putting into perspective strategies. Individuals with a primary/secondary education scored higher in self-blame, catastrophizing and other-blame, coinciding with results found also by other authors (26).


**TABLE 3** | Direct, indirect, and total effects (Model 1).

		Estimate	Std. Error	z-value	p	95% CI	
						Lower	Upper
<b>Direct effects</b>							
 COVID-19	→ GHQ-SS	0.256	0.058	4.404	<0.001	0.135	0.369
	→ GHQ-AI	0.102	0.055	1.862	0.063	-8.21e-4	0.208
	→ GHQ-SD	0.022	0.061	0.365	0.715	-0.102	0.139
	→ GHQ-D	0.066	0.058	1.141	0.254	-0.044	0.210
<b>Indirect effects</b>							
 COVID-19	→ CERQ_RU → GHQ-SS	0.032	0.015	2.094	0.036	0.003	0.062
	→ CERQ_CA → GHQ-SS	0.030	0.014	2.122	0.034	0.006	0.062
	→ CERQ_RU → GHQ-AI	0.043	0.020	2.131	0.033	0.004	0.080
	→ CERQ_CA → GHQ-AI	0.041	0.019	2.178	0.029	0.009	0.082
	→ CERQ_RU → GHQ-SD	0.023	0.011	2.010	0.044	0.003	0.046
	→ CERQ_CA → GHQ-SD	0.020	0.010	2.002	0.045	0.003	0.045
	→ CERQ_RU → GHQ-D	0.031	0.015	2.090	0.037	0.003	0.062
	→ CERQ_CA → GHQ-D	0.037	0.017	2.159	0.031	0.008	0.078
<b>Total effects</b>							
 COVID-19	→ GHQ-SS	0.318	0.063	5.073	<0.001	0.195	0.442
	→ GHQ-AI	0.185	0.063	2.934	0.003	0.063	0.305
	→ GHQ-SD	0.065	0.063	1.033	0.302	-0.066	0.188
	→ GHQ-D	0.134	0.063	2.120	0.034	0.017	0.282

 COVID-19, Anyone COVID-19 positive nearby; CERQ\_RU, Rumination; CERQ\_CA, Catastrophizing; GHQ-SS, Somatic symptoms; GHQ-AI, Anxiety/insomnia; GHQ-SD, Social dysfunction; GHQ-D, Depression (Delta method standard errors, bias-corrected percentile bootstrap confidence intervals).

**TABLE 4** | Direct, indirect, and total effects (Model 2).

		Estimate	Std. Error	z-value	p	95% CI	
						Lower	Upper
<b>Direct effects</b>							
 COVID-19	→ GHQ-SS	0.311	0.062	4.996	<0.001	0.199	0.435
	→ GHQ-AI	0.176	0.062	2.815	0.005	0.054	0.301
	→ GHQ-SD	0.050	0.061	0.814	0.416	-0.085	0.174
	→ GHQ-D	0.116	0.060	1.923	0.055	-0.006	0.244
<b>Indirect effects</b>							
 COVID-19	→ CERQ_PF → GHQ-SS	-1.02e-4	0.002	-0.068	0.946	-0.008	0.004
	→ CERQ_PR → GHQ-SS	0.008	0.009	0.880	0.379	-0.006	0.030
	→ CERQ_PF → GHQ-AI	0.002	0.003	0.583	0.560	-0.002	0.015
	→ CERQ_PR → GHQ-AI	0.008	0.009	0.883	0.377	-0.007	0.031
	→ CERQ_PF → GHQ-SD	0.003	0.005	0.684	0.494	-0.004	0.019
	→ CERQ_PR → GHQ-SD	0.012	0.014	0.893	0.372	-0.012	0.043
	→ CERQ_PF → GHQ-D	0.008	0.011	0.708	0.479	-0.012	0.032
	→ CERQ_PR → GHQ-D	0.011	0.012	0.891	0.373	-0.011	0.041
<b>Total effects</b>							
 COVID-19	→ GHQ-SS	0.318	0.063	5.073	<0.001	0.207	0.443
	→ GHQ-AI	0.185	0.063	2.934	0.003	0.054	0.308
	→ GHQ-SD	0.065	0.063	1.033	0.302	-0.078	0.189
	→ GHQ-D	0.134	0.063	2.120	0.034	0.018	0.279

 COVID-19, Anyone COVID-19 positive nearby; CERQ\_PF, Positive refocusing; CERQ\_PR, Positive reappraisal; GHQ-SS, Somatic symptoms; GHQ-AI, Anxiety/insomnia; GHQ-SD, Social dysfunction; GHQ-D, Depression (Delta method standard errors, bias-corrected percentile bootstrap confidence intervals).

It has been confirmed that home confinement due to health emergency has many effects on psychological well-being (2, 37–41). Our results are along this line, confirming our Hypothesis 4, as negative coping strategies, such as rumination and catastrophizing correlated positively with all the health subscales, while self-blame and other-blame strategies were positively related with the presence of somatic symptoms, anxiety/insomnia and depression. These results coincide with previous studies which reflected that negative coping strategies were related to health problems such as anxiety (5) and stress or depression (6).

Moreover, our results show that positive refocusing and reappraisal correlated negatively with anxiety/insomnia, social dysfunction and depression, and planning was negatively correlated to social dysfunction and depression. This is in agreement with the results of Guo et al. (9) and Goodarzi et al. (8) who observed that problem-focused coping was related to fewer health problems and greater well-being.

Similarly, the results of this study demonstrated that negative coping strategies exerted a mediating effect on the development of somatic symptoms, anxiety/insomnia and depression in those who had COVID-19 positive cases nearby. The mediating role of strategies such as rumination have already been described elsewhere (14). However, Model 2 shows that the use of positive strategies did not buffer the relationship between the presence of COVID-19 nearby and impact on health. Gruszczynska and Rzesutek (18) also described the relationship of positive reappraisal with well-being of persons is complex since they found well-being worsened with time. Therefore, the results of these coping strategies are not necessarily as unified and beneficial as supposed (19).

With these results we can discern that the use of certain coping strategies has a mediating role on the relationship between COVID-19 positive cases nearby and repercussions that it has on mental health as we proposed in the last hypothesis posed.

## Limitations and Future Research

The main limitation of our study is its cross-sectional design, which does not allow us to show how these variables behave over time. Future studies should have longitudinal designs that can show these. Another limitation refers to data collection, which was done using self-report questionnaires, and so there may have been subjective or reliability biases. The technological tools used for snowball sampling and to divulge the questionnaires and online collect the data may have conditioned the subjects who answered, and did not get to the whole population. So future studies could use other strategies for data collection to be able to access different populations.

## Practical Implications

The COVID-19 pandemic has implications for individual and collective health and emotional and social functioning of the population. In addition to providing health care, health services have to consider psychosocial needs. This study has relevant

practical implications that should be considered for intervention in the health of the population in adverse situations such as those triggered by the COVID-19 public health emergency. Interventions should be performed on levels of individuals to institutions, including coping strategies that are postulated as beneficial for the health, and further, consider that they must be adapted to the confinement situation. These interventions would serve as preventive measures for health problems, helping people to develop a wide repertoire of healthy coping strategies.

## CONCLUSIONS

Adverse situations such as those experienced during the worldwide health emergency caused by the SARS-CoV-2 coronavirus cause people to make use of different coping strategies to endure them. These could facilitate the appearance of health problems or act as buffers for them. The rumination coping strategy was the one most used by young adults and by singles. “Negative” coping strategies exerted an indirect effect as mediators on the impact that the presence of COVID-19 cases nearby had on health, however, this effect was not observed for “positive” coping strategies. Based on these results, it is important to design plans to help the population develop coping strategies that enable them to remain healthy in the face of the consequences derived from COVID-19. And also offer an intervention to familiars of patients COVID-19, when the illness is detected and he must to initiate the confinement protocol or if he is hospitalized even.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Almeria Bioethics Committee (Ref. UALBIO2020/032). Written informed consent to participate in this study was provided by the participants’ legal guardian/next of kin.

## AUTHOR CONTRIBUTIONS

MP-F, MM, and EF-M contributed to the concept, design, analysis, and interpretation of the data. ÁM contributed to the technical details and manuscript preparation. MP-F, MM, and EF-M contributed to collecting the data. JG contributed to critically revising the manuscript for important intellectual content and the final approval of the version to be published. All authors accept and agree that the work is original, any methods and data presented are described accurately and honestly, and any relevant interests have been disclosed.



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# Impact of Sleep Deprivation on Emotional Regulation and the Immune System of Healthcare Workers as a Risk Factor for COVID 19: Practical Recommendations From a Task Force of the Latin American Association of Sleep Psychology

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Healthcare workers who are on the front line of coronavirus disease 2019 (COVID-19) and are also undergoing shift schedules face long work hours with few pauses, experience desynchronization of their circadian rhythm, and an imbalance between work hours effort and reward in saving lives, resulting in an impact on work capacity, aggravated by the lack of personal protective equipment (PPE), few resources and precarious infrastructure, and fear of contracting the virus and contaminating family members. Some consequences are sleep deprivation, chronic insomnia, stress-related sleep disorders, and post-traumatic stress disorder. These sleep alterations critically affect mental health, precipitating or perpetuating anxiety, stress, and depression, resulting in the inability to regulate positive and negative emotions. Pre-existing sleep disorders are an important risk factor for the development and maintenance of PTSD when individuals are exposed to an important stressor such as a COVID-19 pandemic. At the same time, how an individual regulates the emotion associated with worries during daytime functioning impacts nighttime sleep, precipitating and perpetuating difficulties in sleeping. All of these changes in sleep and emotional regulation also alter the immune system. Sleep deprivation is commonly associated with chronic inflammatory diseases, due to the desynchronizations in circadian rhythms, causing possible psychophysiological disorders and impaired neuroimmune-endocrine homeostasis. From this perspective, we clarify in this article how sleep disorders affect

the immune system and emotional regulation, explaining their phenomenological and neurobiological mechanisms, and discussing elements of cognitive and behavioral coping for health professionals to adopt and manage a healthier sleep pattern in the COVID-19 outbreak.

**Keywords:** sleep, emotional regulation, immune system, cognitive behavioral therapy, health professionals

## INTRODUCTION

The current severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the causative agent of the ongoing coronavirus disease 2019 (COVID-19) (Tay et al., 2020), has provoked a strong emotional reaction, which affects healthcare workers, symptomatic patients, and the general population. Healthcare workers who are on the COVID-19 front-line undergo shift schedules, have long and strenuous work hours with few breaks, experience circadian rhythm desynchronization, and an imbalance between effort of hours at work and reward in saving lives, resulting in an impact on work capacity, aggravated by the lack of individual protection equipment, fear of contracting the virus, or returning home and contaminating family members. Sleep disorders have been reported as one of the negative results (Belingeri et al., 2020a; Zhang et al., 2020).

The literature has reported how immune function decreases after affective states associated with stress in the face of stressful situations, such as natural disasters, among which depression, anxiety, and loneliness stand out (Ironson et al., 1997). These emotional states and the relationship with the immune response have been described and also associated with sleep disorders such as insomnia and drowsiness, as a result of sleep deprivation, establishing the important role of sleep in emotional regulation and its relationship with immune regulation (Brand et al., 2014; Irwin and Opp, 2017; Vandekerckhove and Wang, 2017).

Both emotional responses and sleep disturbances may be related to the current COVID 19 pandemic, where isolation measures, in addition to the workload, affect health professionals. Due to the burden of stress generated, sleep deprivation, little contact with their family, long hours, and concern for the future, healthcare workers could experience a decrease in their immune response and a lower response to future outbreaks in this sector of the population where COVID 19 has already claimed many victims (Alnofaiey et al., 2020; Conroy et al., 2021). These situations have already been explored in other types of populations (Dubey et al., 2020; Liem et al., 2020; Rajkumar, 2020; Rashidi Fakari and Simbar, 2020; Yang et al., 2020; Yao et al., 2020; Zhu et al., 2020).

Returning to how studies have addressed the relationship between sleep and emotional regulation in the immune system, it has been described as alterations in mitogenic responses, a decrease in the activity of NK cells and a phenotypic decrease in T cells, and the impact of catecholamines through  $\beta_3$  receptors on lymphocytes through the action of hypothalamic adrenal cortisol products (Ironson et al., 1997). What has not yet been analyzed is what occurs when peaks in cases rise, which has been happening in some

countries despite vaccination. These peaks cause a return to isolation measures and other precautions, which causes a stabilization of symptoms of stress and sleep disorders in health professionals, which will be reflected in the decrease in the immune response, for which the measures for both prevention against stress and sleep become valid and of vital importance (Lin and Chen, 2021).

For decades, the biopsychosocial impact of sleep disorders and sleep deprivation caused by shift work schedules has been discussed (Härmä, 1993; James et al., 2017; Cheng and Drake, 2018; Kerkhof, 2018). Much research has provided evidence of intervention possibilities, but the lack of appreciation of sleep complaints by managers persists, seen by the lack of public policies for sleep disorders. Paradoxically, the COVID-19 pandemic highlighted the importance of health professionals to face this situation, but it made visible the lack of care for them.

There is consensus on how to deal with sleep disorders by major organizations (World Sleep Society, European Sleep Research Society, Sleep Brazilian Society, and the Latin American Federation of Sleep Societies) (Sateia et al., 2017; Bacelar and Pinto, 2019; Altena et al., 2020; Federation Latin-American of Sleep Societies, 2020). Cognitive-Behavioral Interventions (such as sleep hygiene) have been elected as the technical gold standard non-pharmacological treatment for many sleep disorders and sleep deprivation. Through this formal recognition, the Latin American Association of Sleep Psychology (LASP) was organized as an association that brings together sleep psychologists in Latin America with goals that involve the identification of psychological factors contributing to the development and/or maintenance of sleep disorders, contributing information to establish the differential diagnosis, in the development and provision of evidence-based cognitive-behavioral assessment and intervention techniques, collaborating to prevent sleep disorders and promoting quality of life.

In this sense, the LASP is aware of its role in the current pandemic and has formulated recommendations for the sleep complaints of the population at different ages and different social contexts, considering cultural differences between the countries of this portion of the American continent. Regarding health professionals, LASP has been concerned with the high number of sleep disorders that are characterized as insomnia in China and the informal reports, although there are no data on sleep disorders from every country. Therefore, this article aims to discuss the impact of sleep disorders on emotional regulation and the immune system. It also aims to adequately characterize these sleep disorders; insomnia is not always Insomnia Disorder, but instead may be insomnia associated with acute stress or a symptom of Posttraumatic Stress Disorder (common in these



pandemic situations), or a symptom of Circadian rhythm sleep-wake disorder shift work type. Recommendations for health professionals to deal with sleep disorders are listed.

## Sleep Definition

Sleep is a global state and a universal mammalian behavior with multiple levels of biological organization (Hobson and Pace-Schott, 2002).

Sleep has been defined as a reversible state, and unlike hibernation and torpor, it is not dependent on the availability of food, water, or environmental temperature (Krystal et al., 2013).

Sleep plays an active role in processes such as synaptic plasticity and memory functions, emotional regulation, metabolic function, energy balance, macromolecule biosynthesis, removal of toxic substances and metabolic waste, and prophylactic cellular maintenance. It has also been postulated that is related to adaptive inactivity; sleep can be viewed as a process of meta regulation, that is a high order of regulation which accommodates a broad range of molecular, cellular, and network processes altogether providing optimal (adaptive) wakefulness (Vyazovskiy, 2015).

In Electrophysiology, normal human sleep is defined by two states—Rapid eye movement (REM) and Non-REM (NREM) sleep—that alternate cyclically across a sleep episode. NREM includes a variably synchronous cortical electroencephalogram (including sleep spindles, K complexes, and slow waves) associated with low muscle tonus and minimal psychological activity. REM sleep EEG is desynchronized, muscles are atonic, and dreaming is typical. On the other hand, behaviorally sleep is a reversible state of perceptual disengagement from and unresponsiveness to the environment (Carskadon and Dement, 2017).

Some factors that determine sleep manifestation, such as homeostatic and circadian timing system, environmental zeitgebers, stress, genetics, psychosocial, medical, and social features (i.e., work schedule), have been described (Borbely et al., 2016; Altona et al., 2020).

## Biological Rhythms

Molecularly, the circadian rhythm of sleep involves interlocking positive and negative feedback mechanisms of circadian genes (period -per 1,2,3-; cryptochrome -cry 1 and 2- clock and Bmal 1), and their protein products in cells of the suprachiasmatic nucleus (SCN) are entrained to ambient conditions by light. Subsequently, circadian information is integrated with information of homeostatic sleep need in the nuclei of the anterior hypothalamus (Hobson and Pace-Schott, 2002).

Episodic Ultradian rhythms have been defined as periodic rhythms that last for 20 min to 6 h, such as the patterns of the electrical activity of the brain and the heart. The functional significance of ultradian events might be in optimizing biological activities mainly by synchronizing compatible processes and preventing the simultaneous activation of incompatible processes, preparing biological systems to respond to stimuli such as cell-cell communication, and interacting with circadian rhythms (Goh et al., 2019).

Unlike ultradian rhythms, sleep and wakefulness have been named “sleep-wake cycle” and are defined as the circadian

(~24-h) rhythm. Sleep regulation has been explained with the two-process model, in which it is postulated that a homeostatic process (Process S) interacts with a process controlled by the circadian pacemaker (Process C), with time-courses derived from physiological and behavioral variables (Borbely, 2009).

The interaction between the homeostasis process (depending on sleep and wake) with a process controlled by the circadian pacemaker determines salient aspects of sleep regulation. REM Slow Wave Activity (SWA) represents the principal marker of Process S during sleep; core body temperature and melatonin rhythms are markers of process C (Borbely et al., 2016).

Process S increases in intensity, and any time that sleep occurs, it is reduced; a daytime nap, for example, causes an exponential decline in process S to the degree that it may interfere with sleep initiation at the usual bedtime. Process C influences the timing of sleepiness based on the endogenous circadian clocks (CC), the SCN of the hypothalamus, primarily by activation and deactivation of the system that promotes waking (Krystal et al., 2013).

In another sense, CC are biological fundamental functions that generate self-sustained 24 h rhythms endogenously (such as sleep-wake cycle) and help tune the organism’s physiology with the predictable cyclic environment generated by the alternation of day and night; unfortunately, social factors (such as work or school schedules) have not been adapted to the sleep-wake cycle, leading to a discrepancy between internal circadian time and external social time constraints. This discrepancy has been named Social Jet Lag (SjL) (Korman et al., 2020).

Social jet lag can be detrimental to health and sleep health in different types of employment, including healthcare workers. As an example, Kang et al. (2020) studied the effect of SjL on sleep quality in nurses; they concluded that overall sleep quality can increase with decreasing day-shift fatigue, decreasing SjL and increasing sleep quality during night shifts.

## Natural Day Light Versus Artificial Light at Night

Environmental cues, mainly nighttime natural darkness, are necessary for normal melatonin synthesis that is essential for biological timekeeping, sleep, and, directly or indirectly, many processes of cells, tissues, and organs. The 24 h Light/Dark cycle of nature conveys crucial temporal cues to the body’s master biological clock (the suprachiasmatic nuclei SCN of the hypothalamus and pineal gland) to achieve internal synchronization of the period and phasing of the Circadian Time Structure CTS (Smolensky et al., 2015).

On the other hand, Artificial Light at Night (ALAN) exposure can disorganize the circadian system, from the level of the molecular clocks that regulate the timing of cellular activities to the level of synchronization between our daily cycles of behavior and the solar day (Potter et al., 2016); ALAN exposure also suppresses melatonin secretion, increases sleep onset latency, and increases alertness, causing circadian misalignment which can cause negative effects on psychological, cardiovascular, and/or metabolic functions (YongMin et al., 2015; Potter et al., 2016).

Throughout the industrialized world, 24 h operations are necessary for public safety and health and are frequently economically advantageous. A subset of shift workers develops shift work disorder (SWD) triggered by circadian misalignment (ICSD-3) (American Academy of Sleep Medicine, 2014). These individuals experience significant negative health consequences and diminished quality of life as a result of shift work (Wickwire et al., 2017).

Some consequences of circadian rhythm and sleep disruption have been described (Potter et al., 2016; Seifalian and Hart, 2019; **Table 1**).

## SLEEP DEPRIVATION, EMOTIONAL REGULATION, AND THE IMMUNE SYSTEM

The immune response protects the organism from substances or organisms that are probably harmful or dangerous. There are many studies that the literature has used to argue the importance of sleep within this immune response and how sleep deprivation influences, in an important way, its regulation (Wilder-Smith et al., 2013; Irwin, 2015).

A first account of this relationship is that during sleep and through its role in the consolidation of long-term memory, such consolidation in the immunological memory is necessary and effective, which occurs during deep slow-wave sleep (stage N3 of sleep), allowing an abstraction of the immune system to remember its action against specific pathogens, in addition to other specific memory threads during the REM state of sleep, which is also related to emotional regulation, which is associated with the decrease of adrenergic loads, which favor immune action (Westermann et al., 2015). It is here where both sleep deprivation and increased responses to stress can alter this process, making the body vulnerable to pathogenic actions, even in the respiratory system, as has been shown in studies that argue that short periods of sleep deprivation are associated with susceptibility to common colds, evidenced and also related to adaptive immunity (Prather and Leung, 2016; Lin et al., 2018).

A second aspect that is important to highlight is that sleep deprivation has a close relationship with two components of our immune response. One such component is innate or non-specific immunity, referring to the defense system with which one is born that forms the first line of defense in the immune response. The other component is related to acquired, adaptive, or specific immunity. It is made up of highly specialized cells and systemic processes that eliminate or avoid the threats of pathogens, generating immune memory and tolerance to the antigens themselves (Wilder-Smith et al., 2013; Irwin, 2015).

### Sleep Deprivation and Adaptive Immunity

When analyzing the adaptive immune response and its relationship with sleep deprivation, the literature has considered that the activity of the hypothalamic-pituitary-adrenal axis is responsible for the distribution of glucocorticoid hormones

through the blood serum, to regulate gene expression in practically every cell in the body. Sleep deprivation causes hormonal activation of leukocyte glucocorticoid receptors, resulting in profound suppression of antiviral gene programs (Wilder-Smith et al., 2013; Irwin, 2015).

Sleep deprivation also gives rise to activation of the sympathetic nervous system (SNS), releasing norepinephrine in primary and secondary lymphoid organs, in all other major organ systems, including our vascular and perivascular tissues, as well as many other peripheral tissues, and stimulates the adrenal glands, also releasing epinephrine. Both neuromediators stimulate leukocytes and adrenergic receptors (e.g., ADRB2) to suppress genetic antiviral (IRG) interferon response (IFN) gene programs, mediated by regulation factors of IRF interferons (Wilder-Smith et al., 2013; Irwin, 2015).

Other studies have linked sleep with the induction of growth hormone release which occurs in the early part of the night. This hormone is involved in improving the proliferation and differentiation of T cells and promoting the activity of type 1 cytokines (Wilder-Smith et al., 2013; Irwin, 2015). According to the above, sleep deprivation reduces the release of growth hormone and suppresses the response of Genetic antiviral interferon (IRG), mediated by IRF regulatory factors, which causes an imbalance in Th1 to Th2 cells, with decreased IFN production in Th1 cells and increased production of interleukin-Th2 cells. 10 (IL-10). This suppression of the adaptive immune response has been hypothesized to contribute to a greater susceptibility to infectious diseases and a lower response to vaccines (Wilder-Smith et al., 2013; Irwin, 2015).

### Sleep Deprivation Innate Immunity

After sleep deprivation, the SNS releases norepinephrine in the primary and secondary lymphoid system and stimulates the adrenal release of epinephrine (Wilder-Smith et al., 2013; Irwin, 2015). Both neuromodulators stimulate ADRB2 leukocyte adrenergic receptors and activate inflammatory systems, which are mediated by nuclear factors (NF)  $\kappa$ B and intrinsic circuits, that in turn are responsible for the detection of microbes through pattern recognition receptors (PRR), among which is the Toll-like-4 receptor (TLR4). This stimulates inflammatory gene expression through NF- $\kappa$ B transcription factors and the production of proinflammatory cytokines, such as interleukin (IL) -6 and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) (Wilder-Smith et al., 2013; Irwin, 2015).

Homeostasis between the internal and external signals of the brain allow it to regulate inflammatory activity. It can also influence brain activity and alter internal balances, sleep being one of the most affected (Wilder-Smith et al., 2013; Irwin, 2015). Therefore, when sleep dysregulation occurs, it can confer an increased risk of inflammatory factors, resulting in cardiovascular disease, cancer, and emotional disorders (Tobaldini et al., 2013). That is where the relationship of the emotional system appears in this triad and at the same time these factors have been considered mortality factors for the transmission of SARS-CoV-2.

**TABLE 1** | Consequences of the disruption of circadian rhythm.

Disrupted glucose metabolism (reduction in insulin sensitivity, impaired TSH Secretion, and nocturnal cortisol secretion increased after sleep deprivation).

Effects on dietary choices (sleep disruption increases non-homeostatic eating propensity and accentuates increased activity in brain regions involved in reward in response to food stimuli, increased appetite, particularly for energy-dense food).

Limited daylight exposure (many individuals are sheltered from the beneficial effects of natural daytime light on behavior and physiology due to a vitamin D deficiency).

Increased light exposure at night (light exposure shortly after dusk during workdays, delaying sleep onset and shortened sleep duration; this has gotten worse due to the use of electronic devices at bedtime and during the day).

Night workers have higher plasma triacylglycerol, circadian misalignment increases blood pressure (mainly during sleep) and inflammatory markers, reverses cortisol rhythms, and reduces heart rate variability and insulin sensitivity in healthy adults.

Disfunction in the gastrointestinal and cardiovascular system are known to be a risk for colorectal and breast cancer.

Impaired cognitive performance and increased frequency of errors in those suffering from regular sleep disturbance; it includes the cognition of health care workers that are providing treatments and therapy to patients in the hospital.

## Sleep and Emotional Regulation

Sleep deprivation also affects the regulation of emotional processing. This condition makes us more emotionally reactive and more sensitive to stressful stimuli and events. Scientific literature has shown how sleep appears to be essential to our ability to cope with emotional stress in everyday life. However, when daily stress is not properly regulated, it can lead to mental health problems and sleep disorders (Vandekerckhove and Wang, 2017). Not only does emotion impact sleep, but there is also evidence that sleep plays a key role in regulating emotion. Emotional events during waking hours affect physiology, sleep patterns, and even the content of daydreams, and the quality and quantity of sleep influence how we react to events that affect our overall well-being (Bileviciute-Ljungar and Friberg, 2020).

Different investigations have shown how sleep has a modulating action on daily emotions, specifically in the interaction between emotional stress, sleep, and its disturbances. Regular sleep from its homeostasis, circadian presence, and in the respective development of REM—NREM cycles is crucial for general well-being and emotional experience during the day (Vandekerckhove and Wang, 2017). This is observed in the first measure, because our executive functions exert a modulating action on our experience and emotional reaction, evidenced in the correct functioning of our frontal limbic connections, improving when REM sleep is intact. The correct processing of negative experiences also occur during REM sleep, which is important in the consolidation of affective memory and allows emotional stabilization in disorders such as depression (Killgore, 2010; Vandekerckhove and Wang, 2017).

Sleep deprivation alters this regulation and makes the person more reactive in the face of aversive reactions, showing a decrease in mean prefrontal activity and its signals sent to the amygdala, which translates into emotional dysregulation (Minkel et al., 2011; Saghir et al., 2018). Psychophysiological factors such as stress, anxiety, and hyperarousal play an important role in causing sleep disturbances. Furthermore, sleep disturbance predicts later development of mental health, while the development of insomnia predicts psychopathology such as depression or post-traumatic stress disorder after an acutely stressful event (Ironson et al., 1997). This could be what happens in health professionals who are exposed to sleep deprivation due

to long hours of work and also face high levels of stress when they are away from their home and/or when they remain in the medical setting because of the concern of contagion generated by living with family after caring for COVID-19 patients.

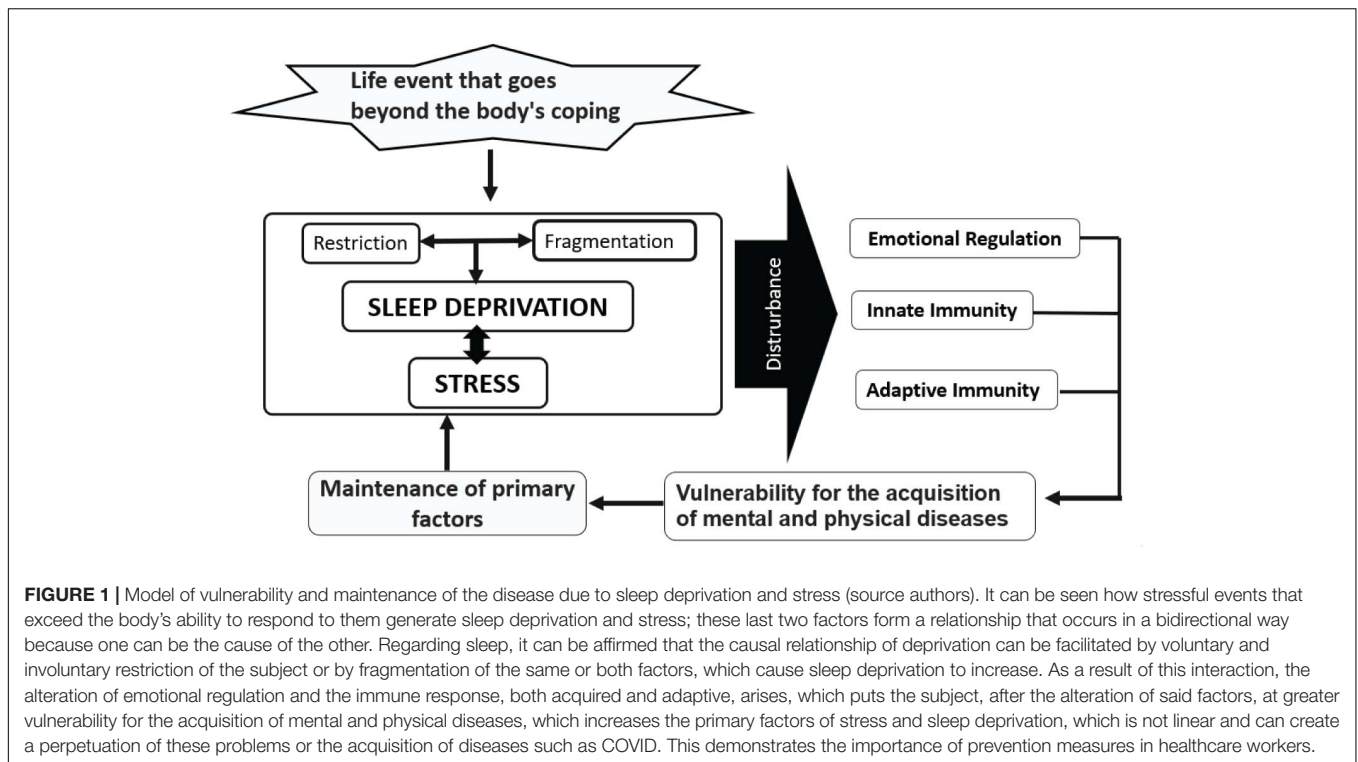
This leads us to conclude a bidirectional role of the action of sleep deprivation, either by restriction or fragmentation on stress in the first place and stress on sleep deprivation second. While it is true that stress causes sleep disturbances, sleep deprivation is a high source of psychological and physiological stress (Meerlo et al., 2008; Van Laethem et al., 2015). For a better understanding, the Model of vulnerability and maintenance of the disease, due to sleep deprivation and stress, is shown in **Figure 1**.

One of the main aspects of this regulation is the regulatory action of cortisol, a hormone involved in the control of stress and reactivity against emotions. It seems that the regulatory alteration of the action of melatonin on cortisol, which is one of circadian disturbances, explains said emotional reactivity and an alteration of the circadian cycle due to sleep deprivation or lack of sleep creates said emotional dysregulation (Posadzki et al., 2018; Brignardello-Petersen, 2019; Meng et al., 2020; Shermohammed et al., 2020).

Sleep deprivation has the consequence of inhibiting the previous processes, causing emotional reactivity and chronic stress, which has been related to chronic diseases, similar to those that occurred in the current COVID pandemic, which leads to the conclusion that the alteration in emotional regulation and circadian lag makes the population vulnerable to contracting COVID, or becoming more vulnerable to the consequences of the disease.

## SLEEP ALTERATIONS IN HEALTHCARE WORKERS

As discussed above, the literature data converge with published data on the situation of healthcare workers during the current outbreak of COVID-19, showing that the perceived poor sleep quality and sleep changes appear to be underlying mechanisms in the relationship between shift and work overload, increased susceptibility to infection, and impact on mental health (Brooks et al., 2018; Belingheri et al., 2020b; Pappa et al., 2020).



The first study published by the research group in Wuhan, China, where the pandemic started (Zhang et al., 2020), showed in a sample of 1,563 individuals that 564 participants (34.6%) had insomnia during their work in the hospitals in Wuhan, and that related factors included isolation, psychological concerns about the outbreak of COVID-19 (uncertainty about effective disease control), and being a doctor. Complementary data from Xiao et al. (2020b) with 180 doctors and nurses who treated patients with COVID-19 infection in Wuhan, China, showed that the staff had poor sleep quality and explained that the associated factors were the energy expended for putting on Personal protective equipment (PPE) every day and the disinfection needed for removing these clothes, the continuous work the isolation wards with a high intensity of high-pressure work, and the high mortality rates of patients associated with the infection by COVID-19. These data were replicated by the population, showing high rates of poor sleep quality associated with stress and anxiety in the context of COVID-19 (Huang and Zhao, 2020).

Data have shown that health professionals complain of insomnia that causes sleep deprivation and bad sleep quality. However, it is necessary to characterize that insomnia can be a chronic condition by itself, caused by the pandemic context, or a symptom of another sleep disorder. This differential diagnosis is relevant to thinking about cognitive and behavioral recommendations for this group.

It is known that the biological disaster of COVID-19 is a stressful situation, as being infected with a life-threatening physical illness is a traumatic event. Further, being a healthcare worker for patients with a deadly virus and having prolonged contact with them can also lead to symptoms of acute stress. Sleep

and post-traumatic stress disorder (PTSD) are closely related. Literature data showed that the COVID-19 pandemic appears to be a risk factor for sleep disorders and PTSD (Casagrande et al., 2020; Yin et al., 2020). Further, Richards et al. (2020) showed sleep alterations (sleep deprivation, sleep fragmentation, and insomnia) could lead to maladaptive sleep-related compensatory behaviors and cause hyperarousal and anxiety-related disorders like PTSD. Moreover, sleep disorders are core features of PTSD. Therefore, insomnia, associated with another sleep-wake disorder, mental disorder, or medical condition, can only be diagnosed as an independent focus of clinical attention, if these conditions are treated and insomnia persists.

Insomnia disorders are characterized by the complaint of persistent difficulty with sleep initiation, duration, consolidation, or quality that occurs despite adequate opportunity and circumstances for sleep. These symptoms should cause clinically significant impairment in social, occupational, educational, academic, and behavioral functioning; otherwise, they will not be classified as Insomnia Disorder. For the diagnosis of Insomnia Disorder, it is necessary to observe the duration and frequency of complaints. The situational difficulties of sleep due to negative environmental circumstances, such as during the COVID-19 pandemic, should be differentiated. Insomnia may be a symptom of Circadian rhythm sleep-wake disorders shift work type (CRSWD) (International Classification of Diseases—11th revision—ICD-11). The CRSWD are persistent or recurrent disturbances of the sleep-wake cycle due to alterations of the circadian time-keeping system, its entrainment mechanisms, or a misalignment of the endogenous circadian rhythm and the external environment (social demands, work and school



**TABLE 2 |** Behavioral and Cognitive measures for health professionals dealing with sleep problems during COVID-19.

Before work	Operational
<ul style="list-style-type: none"> <li>• Avoid starting work tasks with very high sleep debt.</li> <li>• Track total sleep time compared to hours of sleep with the most drowsiness.</li> <li>• Schedule short naps of maximum 30 min based on this.</li> <li>• Maintain, as much as possible, the same amount of sleep in a workday as in a non-workday. This standard is the one that most favors the immune response.</li> <li>• Assessing the use of more than one sleep period as much as possible reduces the potentially serious consequences of strenuous hours.</li> <li>• Taking a nap if possible when you are sleepy is the most efficient method of countering cognitive errors.</li> <li>• Exposure to bright light before work, particularly blue spectrum light, is alerting.</li> <li>• Limit napping just before work to 30 min to reduce sleep inertia problems.</li> <li>• In free time, try to exercise regularly, but not before bedtime or before naps at work breaks.</li> <li>• Encourage the choice of relaxing activities, including socializing with family, before going to sleep or napping—reading a book using a relaxation technique.</li> <li>• When you sleep at home during the day, educate family members or roommates about sleep and the importance of restful sleep. The family must help protect the health professional's sleep from factors such as neighbors, pets, and delivery people.</li> <li>• Helping techniques also include turning the phone off, turning off the TV, or putting it on a white noise channel, wearing earplugs, darkening the bedroom, wearing eye masks, and sleeping in a cool environment.</li> <li>• The management of luminosity before and after work with dark glasses is necessary to collaborate with the regulation of the circadian cycle.</li> <li>• Food intake involves light meals, at specific times, if possible, and not immediately before the start of sleep, to avoid sleep disturbances due to digestion.</li> </ul>	<ul style="list-style-type: none"> <li>• Try to obtain natural light during the day. If it is not possible, use bright lights at work, but not in the room or place where you sleep at work. The idea is to obtain little light in the place where you sleep to help in the pressure to sleep. Suggesting the use of sleep masks that help to darken the environment to favor sleep is a good strategy.</li> <li>• Social interaction with preventive isolation (teamwork), chewing on snacks, singing, and physical exercise can help maintain alertness.</li> <li>• It is recommended to use short exercise breaks (for example, climbing stairs) of at least 6 min and to work in well-lit spaces.</li> <li>• Finally, avoiding excessive consumption of energy drinks, such as caffeine and stimulant self-medication, should also be considered. Doctors must remember that it is unclear whether these drugs restore executive functions after sleep deprivation and it remains unclear how long you can stay alert to compensate for a lack of sleep.</li> <li>• Unfortunately, some health professionals may be kept away from their family or community due to stigma or fear. This can make a situation much more difficult. If possible, suggest that the health professional remain connected with loved ones, even though digital methods, which is a way to keep in touch. Talk to colleagues or other trusted people for social support and to express stress and other emotions and concerns about the work situation during the day—colleagues may be having similar experiences.</li> <li>• Limit exposure time to COVID-19 news as much as possible so as not to exacerbate anxiety.</li> <li>• Create an outline of personal care activities that the professional likes, when not taking care of patients, such as spending time with friends (virtually) and with family, exercising, or reading a book.</li> <li>• Learning from signs and symptoms—paying attention and differentiating sleepiness, fatigue, fear, feelings of sadness, withdrawal, guilt, anxiety, encouraging them to seek breaks, and asking for professional help. This includes psychological help.</li> <li>• If the health workers identify symptoms related to sleep deprivation, fatigue, errors in performing work-related tasks, inability to concentrate or make decisions, extreme irritability, or strong emotional reactions, should inform colleagues and superiors and take a nap. Even a short nap can help partially reduce these symptoms.</li> </ul>

schedules, or the light-dark environment). The most common complaints are excessive sleepiness or insomnia, or even both (International Classification of Diseases—11th revision—ICD-11; International classification of sleep disorders, 3rd edition.—ICSD-3) (American Academy of Sleep Medicine, 2014).

The CRSWD shift work type is associated with significantly higher odd burnout syndrome and job dissatisfaction (Bagheri Hosseini et al., 2019). Furthermore, the disruption of circadian rhythm may impair immune system function, among other consequences, as mentioned previously (Cuesta et al., 2016).

## BEHAVIORAL AND COGNITIVE RECOMMENDATIONS for SLEEP QUALITY IN HEALTH PROFESSIONALS DURING THE COVID-19 PANDEMIC

Many protective recommendations have been put forward to deal with the SARS-CoV-2 pandemic, but no scientific society around the world (World Health Organization, 2018), including WHO,

has devoted itself to sleep problems, except for the task force of the European CBT-I Academy (Altena et al., 2020).

Researchers from China, the initial epicenter of the pandemic, have discussed social support (size and source of social networks of people helping others, as well as emotional, material, and supportive functions informative—Brugha, 1990) and capital social (social trust, belonging, and social participation—Harpham et al., 2004) as important mediating factors to improve sleep quality (Xiao et al., 2020a) and to help in the sense of self-efficacy by professionals (that refers to individual judgment on the ability to complete a certain behavior or task—Bandura, 1977).

In this sense, it is important to consider the risk and protective factors to suggest behavioral and cognitive recommendations to sleep quality in health professionals during the COVID-19 pandemic, to help with social support, social capital, and a sense of self-efficacy. Factors that negatively affect sleep, in addition to those mentioned above (pandemic stress, work pressure, or irregular or night shift work patterns), include loneliness, negative family environment, technology use, evening light, pre-sleep worry, and the use of caffeine, tobacco, and alcohol. Fear of missing out on family contact and their health and excessive

technology use negatively impact sleep. Persons with comorbid medical, psychiatric, and other sleep disorders such as sleep apnea, and individuals with a strong need for stable hours of sleep, may be at particular risk. Factors that positively affect sleep include social support, good family environments, good sleep hygiene, and physical activity (Altena et al., 2020; Federation Latin-American of Sleep Societies, 2020).

The literature maintains that behavioral and cognitive intervention strategies (Mullins et al., 2014; Aliyu et al., 2018; Marín Agudelo et al., 2019; Almondes, 2020; Altena et al., 2020; Federation Latin-American of Sleep Societies, 2020; Holding et al., 2020) can be applied as preventive measures for health personnel, in addition to the classic norms of sleep hygiene and finding preventive measures before work and operative measures during work (Table 2).

## FINAL CONSIDERATIONS

In order to improve decision-making and reduce the risk of errors at work, it is urgent that the work protocols, with patients with COVID 19, contain measures to improve the sleep of health personnel.

It is important that the recommendations mentioned above are used to reinforce a positive appraisal of the situation with the help of sleep psychologists, avoiding the development of psychopathological conditions and sleep disorders, in order to deal with this situation. It is important to encourage positive coping styles. Coping represents the cognitive and behavioral patterns to manage particular external and/or internal demands appraised as taxing or even exceeding the resources of individuals (Folkman and Lazarus, 1988). In our opinion, three different coping strategies will help the physical and mental health of professionals, since practical behaviors such as emphasizing positive cognitions, understanding sleep alterations and emotional regulation, and getting more information can be associated with fewer mental health problems and sleep problems (Dubey et al., 2020; Guo et al., 2020; Wang et al., 2020): (1) Coping focused on evaluation involves attempts to understand sleep alterations and the cognitive and behavioral variables involved in the context of the COVID-19 pandemic, with information and professional support; (2) Coping focused on problem involves the development of a coping plan, seeking internal resources to find solutions to deal with the situation, and

redefining thoughts to be more positive; (3) Coping focused on emotions involves individual control of emotions and emotional balance, involving efforts to maintain hope when dealing with a stressful situation through emotional regulation, psychoeducation and sleep hygiene techniques, becoming aware, and engaging in pleasurable activities that bring a sense of accomplishment.

Finally, for future post-pandemic phases, it is important to formulate public policies for decisions and actions in the face of sleep disorders.

## CONCLUSION

The occupational field of the health professional during the pandemic brings with it an increase in the workload and a displacement of sleep schedules, causing sleep deprivation and increased stress. Both stress and its deprivation have a bidirectional relationship, intimately linked to the immune system and the regulation of emotions, which creates an increase or presence of sleep disturbances, emotional disturbances, and the appearance of immunological vulnerability.

The literature has reported that these aspects can be prevented through strategies that must be carried out before and after work, in order to mitigate the aforementioned problems and establish better coping strategies both for the COVID 19 pandemic and for problems and contingencies that may arise in the future. The main objective when preparing this document was to present concrete tools that have served in other similar situations and apply them at this time for health professionals. A further aim was to ensure that in future perspectives, faced with similar problems, these tools can be the starting point to improve the quality of life of health professional in times of these crises, which is why this working group meets and this approach is presented for health professionals.

For future consensus and working groups, it remains for us to return to these issues raised and conduct research that will allow us to affirm these recommendations objectively.

## AUTHOR CONTRIBUTIONS

KA, HA, and UJ-C: study design, writing the draft, integration of the authors' comments, and final manuscript. All authors contributed to the article and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer RK declared a past collaboration with one of the authors KA.

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# The Association Between Social Support, COVID-19 Exposure, and Medical Students' Mental Health

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**Background:** The coronavirus disease—2019 (COVID-19) pandemic has halted in-person medical education worldwide. Limited studies have reported on the mental health status of medical students during this public health emergency. This study aimed to explore the association of personal virus exposure, regional epidemic condition, and social support with medical students' depressive and anxiety symptoms during the COVID-19 outbreak in China.

**Methods:** In February 2020, 5,982 medical students (60.0% females, Mean<sub>age</sub> = 21.7 years, Median<sub>age</sub> = 22 years) completed an online survey consisting of demographics, personal virus exposure, the Patient Health Questionnaire, the Generalized Anxiety Disorder Scale, and the Social Support Rating Scale.

**Results:** The prevalence rates of mild to severe depressive symptoms and anxiety symptoms were 35.2 and 22.8%, respectively. Multivariate linear regression showed that students with low- or medium-level social support had a higher risk of experiencing depressive or anxiety symptoms than those with high-level social support. COVID-19 exposure was positively associated with mild to severe depressive or anxiety symptoms. Respondents living in provinces with 500–1,000 confirmed COVID-19 cases had an increased risk of experiencing mild to severe depressive symptoms compared with those living in provinces with <100 cases. Other related factors were gender and years of training.

**Conclusions:** Some medical students suffered from a poor psychological status during the COVID-19 outbreak. Low social support was a stronger factor related to poor mental status compared with COVID-19 exposure or the provincial epidemic condition. Thus, we suggest that colleges or universities provide social support and mental health screening.

**Keywords:** depression, anxiety, COVID-19, medical students, exposure, social support

## INTRODUCTION

Newly emerging infectious diseases are black swan incidents that are challenging for global healthcare systems. National capacities for coping with public health emergencies rely heavily on healthcare human resource preparedness. It is questionable whether mass news coverage, potential exposure to coronavirus disease—2019 (COVID-19), and possible suspended education (1, 2) can impact medical students. Medical students have multiple identities, such as future healthcare workers, young adults, and common citizens. Their emotions and psychological suffering during this outbreak may provide important information toward preparing human resources for further health emergencies.

Meta-analyses showed that, on normal days, the prevalence rates of depression and anxiety among all medical students were approximately 27% (3–5) and 30% (6), respectively. The risk factors were being female, receiving 1st year undergraduate or postgraduate education, and poor psychological support (5, 7, 8).

The COVID-19 pandemic has influenced the mental health status of college or university students. A meta-analysis showed that approximately one-third of college or university students had depressive or anxiety symptoms (9). Different testing procedures, dates, scales, or the cutoff points of scales may result in varied prevalence rates (9), such as 12% in Greece ( $N = 1,104$ ) (10) and nearly half in France ( $N = 619$ ) (11). An online survey conducted among 11,787 Chinese college students in February 2020 showed that the prevalence rates of depressive [the Patient Health Questionnaire—nine-item (PHQ-9)  $\geq 5$ ] and anxiety [the seven-item Generalized Anxiety Disorder Scale (GAD-7)  $\geq 5$ ] symptoms were 25.9 and 17.8%, respectively (12). This study also found that traveling to or living in the outbreak “hotspot” area was associated with a higher risk of depressive and anxiety symptoms (12). Another survey from Guangdong Province in China found that the rate of depressive symptoms among college students was 7% ( $N = 361,969$ , PHQ-9  $\geq 10$ ) (13).

Some studies have focused on the mental health status of medical students during epidemic outbreaks. Previous studies reported that medical students had increased anxious feelings after the severe acute respiratory syndrome (SARS) (14) and the Middle East respiratory syndrome coronavirus (MERS) outbreaks (15). Furthermore, varied prevalence rates of poor mental health status were reported in different areas after the COVID-19 outbreak. In February 2020, 25.3% of Chinese medical students ( $N = 933$ ) were reported to have depressive symptoms (PHQ-9  $\geq 5$ ) and 17.1% of them were with anxiety symptoms (GAD-7  $\geq 5$ ) (16). A small-scale survey ( $N = 217$ ) conducted in a Chinese university in February 2020 found that 37% of medical students had a serious mental illness [the Kessler 6 Psychological Distress Scale (K6)  $\geq 12$ ] (17). A comparative study found that 1,442 Chinese health professional students (including 764 medical students) experienced increased distress (K6  $\geq 5$ , 26.6%) and acute stress in February 2020 compared with that in the pre-pandemic in October 2019 (18). In addition, nearly half of the medical students in the United Arab Emirates had mild to severe anxiety symptoms ( $N = 1,485$ , GAD-7  $\geq 5$ ) in March 2020 (19). During the initial

period of the COVID-19 pandemic, 49.9% of 425 Bangladeshi medical students reported anxiety and 69.9% of them were with depressive symptoms through an online survey using the Hospital Anxiety and Depression Scale (20). A survey conducted in the United States ( $N = 741$ ) also showed that COVID-19 disrupted medical education and clinical training and that medical students experienced moderate stress and anxiety, which was measured using one Likert item (2). In Pakistan, approximately one in five final-year medical students ( $N = 2,661$ ) felt bored or nervous about the closure of their institutes because of the COVID-19 pandemic in June 2020 (21).

All of these studies among medical students did not explore the association between the severity of viral exposure and mental health. Additionally, mental health during a crisis is often related to social support (22). The government enforced “physical distancing” aimed at infection control, such as the transition from classroom learning to virtual learning, which may result in personal isolation (23). However, previous research has poorly studied the possible effect of social support on medical students’ mental health during epidemic outbreaks. Studies during the COVID-19 pandemic showed that low-level social support was associated with a higher risk of mild to severe depressive or anxiety symptoms among Chinese college students (24), Chinese adolescents (25), and British pregnant women (26). More perceived social support was associated with a decreased risk of sleep disturbance and suicidal ideation among the Taiwanese population (27).

Thus, this study aimed to explore whether personal virus exposure, regional epidemic condition, and social support were associated with medical students’ depressive and anxiety symptoms during the period of the fast-spreading COVID-19 outbreak in China. It would inform medical educators and health policymakers to take measures in order to make young health workforce or students mentally well-prepared for public emergencies.

## METHOD

This cross-sectional survey enrolled respondents between February 11, 2020 and February 18, 2020. The retrospective design collected information on the period from the fast outbreak at the end of January 2020 to the stable epidemic in the middle of February 2020. After the COVID-19 outbreak in China at the end of 2019, more than 30,000 health workers from other provinces were deployed to the frontlines to fight against the virus in Hubei Province (28). Due to high hospital-associated transmission risks (29), as of February 14, 2020, 1,716 health workers were diagnosed with COVID-19 because of hospital-acquired infections, and eight of them died (30).

We distributed online questionnaires through messaging and social media apps (WeChat and QQ) to medical school staff and students. Students’ participation was anonymous and voluntary. They completed the questionnaires on the Wenjuanxing survey platform (<https://www.wjx.cn/>). All subjects were informed of an introduction to the study and provided online informed consent before starting the survey. They did not receive any reward.

Epidemic condition data were from the official daily briefings of the Health Commission of China or provincial health commissions (31).

The Institutional Review Board of Beijing HuiLongGuan Hospital approved this study.

## Participants

Medical students were defined as full-time undergraduate or graduate students majoring in clinical medicine. According to the medical practice policy in China, only those studying clinical medicine could be qualified to register to practice (modern medicine) in the future. After a 5-year undergraduate medical education program, medical students can schedule their National Medical Practitioner Examination the following year. After they pass the exam, acquire practice licenses, and complete 2 years of standardized residency training programs, they can finally seek registration to practice medicine.

We included medical students who were 18–35 years old and who finished all the questionnaires. Then, we excluded those who were living abroad or completed the questionnaires in <3 min.

## Measurement

Possible personal COVID-19 exposure was identified if the person was diagnosed with COVID-19, if the person's family members or close contacts were diagnosed with COVID-19, or if the person was under involuntary isolated care or observation.

The provincial epidemic condition was converted from the cumulative confirmed COVID-19 cases in the respondent's present residential province on the day before the answering day. It was categorized into four levels: "1–100," "100–499," "500–999," and "1,000 and above."

Depressive symptoms within the past 14 days were screened using the nine-item PHQ-9, with each of the nine DSM-IV criteria scored on a scale from 0 "not at all" to 3 "nearly every day" (32). The score ranges for symptom severity are 0–4 for minimal, 5–9 for mild, 10–14 for moderate, and 15–27 for severe (32). The scale was validated in Chinese university students with a clinically significant cutoff point of 10 (33). The majority of studies among medical students or students' mental health during the COVID-19 pandemic only presented results on mild to severe depressive symptoms using five as the cutoff point (3, 9, 12, 16, 34). For a better comparison with previous research and policy attention for subclinical symptoms, we used two cutoff points, namely a PHQ score  $\geq 5$  for mild to severe depressive symptoms and a PHQ score  $\geq 10$  for moderate to severe depressive symptoms. The Cronbach's  $\alpha$  in the present study was 0.87.

Anxiety symptoms within 14 days were screened using the seven-item GAD-7, with items rated from 0 "not at all" to 3 "nearly every day" (35). The score ranges for symptom severity are 0–4 for minimal, 5–9 for mild, 10–14 for moderate, and 15–21 for severe. The clinical cutoff point at 10 was validated in China (36). Some studies on college students during the COVID-19 pandemic used five as a cutoff point for mild to severe anxiety symptoms (12, 16, 25). In our study, the result of the GAD score  $\geq 5$  for mild to severe anxiety symptoms and the GAD score  $\geq 10$  for moderate to severe anxiety symptoms were presented. The Cronbach's  $\alpha$  in this study was 0.92.

Social support was assessed using the Social Support Rating Scale (SSRS), which measured subjective social support, objective social support, and support utility (37). The total score was categorized into three levels ("low," "medium," and "high") using terciles as cutoff points because its distribution was skewed (38). The Cronbach's  $\alpha$  in the present study was 0.95.

Recent emotions were collected using a multiple-choice question: "Please choose one or more words to describe your emotions toward the COVID-19 outbreak within the past seven days." The seven emotion words were: "terrified," "pessimistic," "numb (detached)," "nervous," "helpless," "calm," and "angry."

Demographics included age, gender, years of training, and residence area (rural/urban). The 3 years of training subgroups were: undergraduates (years 1–3), undergraduates (years 4–5), and graduate students. In the Chinese 5-year medical curriculum, the preclinical phase included 3 or more years of education on medical concepts and science. Students usually start clinical education or internship at teaching hospitals once a week during their 4th year. In the 5th year, they engaged in full-time clinical rotations. Medical graduate students should complete residency training programs during their graduate education.

## Power

We used a sample size calculation for the logistic regression (39). According to previous research on the prevalence of depressive symptoms among medical students or college students (3, 9), we set  $P_{x=0} = 0.27$ ,  $P_{x=1} = 0.40$ . Then, we assumed a detectable odds ratio (OR) of 1.2,  $\alpha = 0.05$ , power = 0.8. Thus, the sample size would be 4,890.

## Statistical Analysis

The chi-squared test and Mann–Whitney rank-sum test examined differences in the rates of symptoms or emotions by the four ordered provincial epidemic conditions. Multivariable logistic regression tested the associations of COVID-19 exposure factors and social supports with depressive symptoms or anxiety symptoms, controlling for age, gender, years of training, and residence area. We presented the regression results for mild to severe depressive symptoms, moderate to severe depressive symptoms, mild to severe anxiety symptoms, and moderate to severe anxiety symptoms, respectively.

The software for statistical analysis was Stata 15.0 for Windows (StataCorp, College Station, TX, USA). Statistical significance was set at  $P < 0.05$ .

## RESULTS

### Demographics

In total, 5,982 medical students participated the survey and finished all questions. The median age was 22 years [interquartile range (IQR) = 3, range = 18–35, mean = 21.7, standard deviation (SD) = 2.5], and 60.0% were female. The students came from all provincial regions of China except for Macau (Table 1). The majority (69.3%) were first to 3rd year undergraduates, approximately one in five were 4 and 5th year undergraduates, and the other were graduate students. Among them, 63.0% lived in rural areas.

**TABLE 1** | Demographics, epidemiological characteristics, and depressive or anxiety symptoms among Chinese medical students during the 2019 coronavirus disease (COVID-19) outbreak ( $N = 5,982$ ).

Variables	<i>n</i>	%	Depressive symptoms <sup>a</sup>				Anxiety symptoms <sup>b</sup>			
			Minimal (%)	Mild (%)	Moderate (%)	Severe (%)	Minimal (%)	Mild (%)	Moderate (%)	Severe (%)
Age (years) median, IQR	22	3								
Total	5,982	100	64.8	25.3	6.6	3.2	77.2	18.6	2.3	1.8
Possible COVID-19 exposure										
No	5,433	90.8	65.6	24.7	6.6	3.1	78.0	17.9	2.3	1.8
Yes	549	9.2	56.8	31.3	7.3	4.6	69.6	25.7	2.4	2.4
Provincial epidemic condition <sup>c</sup>										
<100	389	6.5	69.9	19.5	6.4	4.1	79.9	15.4	2.6	2.1
100–499	4,894	81.8	65.0	25.3	6.5	3.2	77.5	18.3	2.4	1.8
500–999	305	5.1	59.3	31.8	6.9	2.0	71.8	24.3	2.3	1.6
1,000 and above	394	6.6	62.2	26.1	7.9	3.8	75.1	20.8	1.5	2.5
Social support <sup>d</sup>										
High	1,852	31.0	76.6	19.3	3.0	1.1	85.6	12.3	1.3	0.8
Medium	2,079	34.8	67.8	24.3	5.9	2.0	78.4	18.2	1.9	1.5
Low	2,051	34.3	51.2	31.8	10.6	6.4	68.5	24.7	3.7	3.1
Gender										
Male	2,391	40.0	69.1	22.6	5.7	2.6	80.0	16.4	2.0	1.6
Female	3,591	60.0	62.0	27.1	7.3	3.6	75.4	20.0	2.6	2.0
Year of training										
Undergraduates, years 1–3	4,146	69.3	64.2	25.9	6.7	3.3	77.2	18.9	2.1	1.9
Undergraduates, years 4–5	1,356	22.7	68.0	23.0	5.8	3.2	79.9	15.6	2.8	1.7
Graduate students	480	8.0	61.7	27.1	8.5	2.7	70.4	24.8	2.7	2.1
Residence										
Urban	2,213	37.0	65.3	24.4	6.9	3.5	78.2	17.5	2.6	1.7
Rural	3,769	63.0	64.6	25.9	6.5	3.0	76.7	19.2	2.2	1.9

IQR, interquartile range.

<sup>a</sup>Categories for increasing depressive symptoms, which were measured using the Patient Health Questionnaire: 0–4 for minimal, 5–9 for mild, 10–14 for moderate, and 15–27 for severe.

<sup>b</sup>Categories for increasing anxiety symptoms, which were measured using the Generalized Anxiety Disorder Scale: 0–4 for minimal, 5–9 for mild, 10–14 for moderate, and 15–21 for severe.

<sup>c</sup>Provincial confirmed COVID-19 cases 1 day prior to the answering day. Data were from health commissions.

<sup>d</sup>The levels of social support were converted from the total scores for Social Support Rating Scales with terciles as cut points.

Results statistically significant at  $p < 0.05$  level are in bold.



## Epidemiological or Clinical Characteristics

The median scores for PHQ-9 was 3 (IQR = 6, range = 0–27) and that for GAD-7 was 1 (IQR = 4, range = 0–21). Approximately one-third (35.2%) of the respondents had mild to severe depressive symptoms, and one in 10 (9.8%) had moderate to severe depressive symptoms (**Table 1**). More than one-fifth of patients (22.8%) had mild to severe anxiety symptoms. Only 4.2% of patients had moderate to severe anxiety symptoms. The Cohen's *d* of both the PHQ score and the GAD score between with and without personal exposure was 0.18.

Nearly one in ten (9.2%) respondents were at possible risk due to personal exposure to COVID-19 (**Table 1**), and 26 of them reported that they or their family members were infected. Those with COVID-19 exposure had an elevated severity of depressive [ $\chi^2_{(3)} = 18.35, P < 0.001$ ] and anxiety [ $\chi^2_{(3)} = 21.89, P < 0.001$ ] symptoms than those without COVID-19 exposure.

Two in five (40.7%) respondents living in provinces with 500–999 confirmed cases had mild to severe depression, which was higher than that of others [1,000 and above confirmed cases, 37.8%; 100–499 cases, 35.0%; 1–100 cases, 30.1%;  $\chi^2_{(9)} = 17.67, P = 0.039$ ] (**Table 1**).

The highest rate of mild to severe anxiety symptoms was also among respondents in provinces with 500–999 confirmed cases (28.2%), followed by those in provinces with over 1,000 provincial cases (24.9%), 100–499 cases (22.5%), and 1–100 cases (20.0%). However, the association between provincial epidemic condition and anxiety symptoms was insignificant [ $\chi^2_{(9)} = 13, P = 0.162$ ].

The median score for social support was 36 (IQR = 9, range = 11–60). Increased social support was associated with a decreased severity of depressive [ $\chi^2_{(6)} = 350.62, P < 0.001$ ] and anxiety [ $\chi^2_{(3)} = 174.83, P < 0.001$ ] symptoms.

## Emotions Within 7 Days

Approximately three-fourths (72.5%) of the respondents stated that they felt calm about the COVID-19 outbreak within 7 days, and nearly half (47.7%) reported that they felt nervous. Approximately one in five reported that they felt angry (20.2%) or terrified (18.3%). Helpless, numb, and pessimistic emotions were experienced by 12.6, 10.7, and 8.1% of the respondents, respectively.

Respondents living in a severe provincial epidemic condition reported more numbness (detached feelings) about the outbreak ( $z = 2.71, P = 0.007$ ): <100 cumulative COVID-19 cases, 14.7%, 100–499, 11.1%, 500–999, 10.6%, and 1,000 and above, 8.2%. Other emotions did not vary significantly between the different provincial epidemic conditions (all  $P > 0.05$ ).

## Related Factors for Depressive Symptoms

Logistic regression (**Table 2**, model 1) showed that the risk factors for mild to severe depressive symptoms were low-level social support [adjusted odds ratio (AOR) = 3.19, 95% CI = 2.77–3.67] or medium-level social support (AOR = 1.53, 95% CI = 1.33–1.76), female gender (AOR = 1.48, 95% CI = 1.32–1.65), 500–999 provincial confirmed cases (AOR = 1.50, 95% CI = 1.08–2.08), and COVID-19 exposure (AOR = 1.33, 95% CI = 1.11–1.61). 4 or 5th year undergraduates reported fewer depressive

symptoms (AOR = 0.81, 95% CI = 0.69–0.95) compared with other undergraduates. Residence areas (urban/rural) were not associated with depressive symptoms. No interaction effect was observed in the model.

Moreover, when the analysis was repeated using moderate to severe depressive symptoms as the dependent variable, the odds ratio of COVID-19 exposure or provincial epidemic condition was insignificant ( $P > 0.05$ ; **Table 2**, model 2). The effect of low-level social support (AOR = 4.89, 95% CI = 3.78–6.33), medium-level social support (AOR = 1.98, 95% CI = 1.50–2.62), and female gender (AOR = 1.47, 95% CI = 1.22–1.77) remained significant.

## Related Factors for Anxiety Symptoms

Female gender (AOR = 1.36, 95% CI = 1.20–1.55), living in rural areas (AOR = 1.14, 95% CI = 1.00–1.30), possible COVID-19 exposure (AOR = 1.40, 95% CI = 1.15–1.71), and medium-level (AOR = 1.62, 95% CI = 1.37–1.92) or low-level (AOR = 2.78, 95% CI = 2.37–3.27) social support were associated with an elevated risk of mild to severe anxiety symptoms (**Table 3**, model 1). Fourth or Fifth year undergraduates (AOR = 0.79, 95% CI = 0.65–0.95) had lower anxiety symptom rates than 1st to 3rd year undergraduates. No significant relationship was found between the provincial epidemic condition and anxiety symptoms ( $P > 0.05$ ). However, the interaction effect was not statistically significant.

Furthermore, possible COVID-19 exposure and the provincial epidemic condition were not associated with an elevated risk of moderate to severe anxiety symptoms (all  $P > 0.05$ ; **Table 3**, model 2). Low-level social support (AOR = 3.45, 95% CI = 2.40–4.95), medium-level social support (AOR = 1.64, 95% CI = 1.10–2.44), and female gender (AOR = 1.35, 95% CI = 1.03–1.76) increased the risk of these symptoms.

## DISCUSSION

This large-scale survey demonstrated that most of the medical students had good mental status and calm feelings. Furthermore, mild depressive symptoms and anxiety symptoms were relatively common. Possible exposure to COVID-19 and provincial epidemic spread were associated with a slightly increased risk of poor mental health, while low social support was a more relevant factor.

The prevalence rates of mild to severe depressive (35%) and anxiety (23%) symptoms in our study were higher than those in another survey of Chinese medical students (25.3% for depressive symptoms and 17.1% for anxiety symptoms) that was conducted during a similar period using the same scales and cutoff points (16). Both studies used convenience sampling, but our sample size was much larger. The rates of depressive and anxiety symptoms in the medical students in our study were higher than those reported in a Chinese college student survey (25.9% for depressive symptoms and 17.8% for anxiety symptoms) in February 2020, which used the same cutoff points for the same scales (12). In addition, the rates in our study were also higher than the rates among Chinese medical students on normal days: 29% for depressive symptoms and 21% for anxiety symptoms

**TABLE 2** | Logistic regression on depressive symptoms among Chinese medical students during the 2019 coronavirus disease (COVID-19) outbreak ( $N = 5,982$ ).

Variables	Model 1: mild to severe depressive symptoms <sup>a</sup>				Model 2: moderate to severe depressive symptoms <sup>b</sup>			
	AOR	95% CI		P	AOR	95% CI		P
		LL	UL			LL	UL	
Possible COVID-19 exposure								
No	1.00				1.00			
Yes	<b>1.33</b>	<b>1.11</b>	<b>1.61</b>	<b>0.003</b>	1.12	0.84	1.49	0.434
Provincial epidemic condition <sup>c</sup>								
<100	1.00							
100–499	1.20	0.95	1.51	0.129	0.85	0.60	1.21	0.376
500–999	<b>1.50</b>	<b>1.08</b>	<b>2.08</b>	<b>0.015</b>	0.75	0.44	1.26	0.278
1,000 and above	1.26	0.92	1.72	0.142	0.98	0.62	1.56	0.942
Social support <sup>d</sup>								
High	1.00				1.00			
Medium	<b>1.53</b>	<b>1.33</b>	<b>1.76</b>	<b>&lt;0.001</b>	<b>1.98</b>	<b>1.50</b>	<b>2.62</b>	<b>&lt;0.001</b>
Low	<b>3.19</b>	<b>2.77</b>	<b>3.67</b>	<b>&lt;0.001</b>	<b>4.89</b>	<b>3.78</b>	<b>6.33</b>	<b>&lt;0.001</b>
Age (years)	1.00	0.97	1.04	0.871	1	0.95	1.05	0.943
Gender								
Male	1.00				1.00			
Female	<b>1.48</b>	<b>1.32</b>	<b>1.65</b>	<b>&lt;0.001</b>	<b>1.47</b>	<b>1.22</b>	<b>1.77</b>	<b>&lt;0.001</b>
Grade								
Undergraduates, years 1–3	1.00				1.00			
Undergraduates, years 4–5	<b>0.81</b>	<b>0.69</b>	<b>0.96</b>	<b>0.014</b>	0.89	0.68	1.16	0.377
Graduate students	1.00	0.76	1.38	0.869	1.12	0.71	1.78	0.626
Residence								
Urban	1				1			
Rural	1.07	0.95	1.20	0.252	0.95	0.79	1.14	0.581

AOR, adjusted odds ratio; CI, confidence interval; LL, low level; UL, upper level.

<sup>a</sup>Scores for the Patient Health Questionnaire  $\geq 5$ .

<sup>b</sup>Scores for the Patient Health Questionnaire  $\geq 10$ .

<sup>c</sup>Provincial confirmed COVID-19 cases 1 day prior to the answering day. Data were from health commissions.

<sup>d</sup>The levels of social support were converted from the total scores for Social Support Rating Scales with terciles as cut points.

Results statistically significant at  $p < 0.05$  level are in bold.

(40). The small number of elevated mental problems may have occurred because the COVID-19 outbreak happened during the Spring Festival, the most important family gathering for Chinese people. Most students were at home rather than at universities or medical settings, meaning that they had more family support and lower occupational infection risk. The low prevalence rate of anxiety may be related to the decisive governance of the Chinese central government, social mobilization, mass official health education, and timely news updates from official media (41).

COVID-19 exposure increased the likelihood of mild to severe depressive or anxiety symptoms more than the provincial epidemic condition. Being an infected person or with family caregivers fighting against a communicable disease means directly facing death, loss, care-seeking, and even financial issues (42). These life events may be more related to poor mental health than provincial epidemic conditions. When the number

of provincial confirmed cases of COVID-19 was between 500 and 1,000, the medical students expressed more depressive symptoms. The initial rapid COVID-19 outbreak required people in their respective regions to quickly adjust their minds and lifestyle and adapt to the “new normal.” Therefore, we found that the association between the depression rate and the severity of the provincial epidemic condition was not linear but like an inverted “U” even after being adjusted for personal virus exposure and other factors. Furthermore, it is surprising that the relationship between provincial epidemic conditions and anxiety symptoms was insignificant. Another study among Chinese college students showed that confirmed COVID-19 cases in the current residence area were not associated with depressive (PHQ  $\geq 5$ ) or anxiety (GAD  $\geq 5$ ) symptoms (12). However, their study only presented crude odds ratios rather than ratios adjusted for demographics and social support. Then, it is important

**TABLE 3** | Logistic regression on anxiety symptoms among Chinese medical students during the 2019 coronavirus disease (COVID-19) outbreak ( $N = 5,982$ ).

Variables	Model 1: mild to severe anxiety symptoms <sup>a</sup>				Model 2: moderate to severe anxiety symptoms <sup>b</sup>			
	AOR	95% CI		P	AOR	95% CI		P
		LL	UL			LL	UL	
Possible COVID-19 exposure								
No	1.00				1.00			
Yes	<b>1.40</b>	<b>1.15</b>	<b>1.71</b>	<b>0.001</b>	1.08	0.71	1.66	0.715
Provincial epidemic condition <sup>c</sup>								
<100	1.00							
100–499	1.10	0.85	1.43	0.469	0.82	0.49	1.35	0.427
500–999	1.40	0.98	2.02	0.065	0.77	0.36	1.64	0.498
1,000 and above	1.11	0.78	1.57	0.559	0.77	0.38	1.55	0.456
Social support <sup>d</sup>								
High	1.00				1.00			
Medium	<b>1.62</b>	<b>1.37</b>	<b>1.92</b>	<b>&lt;0.001</b>	<b>1.64</b>	<b>1.10</b>	<b>2.44</b>	<b>0.015</b>
Low	<b>2.78</b>	<b>2.37</b>	<b>3.27</b>	<b>&lt;0.001</b>	<b>3.45</b>	<b>2.40</b>	<b>4.95</b>	<b>&lt;0.001</b>
Age (years)	1.02	0.99	1.06	0.241	1.04	0.96	1.12	0.383
Gender								
Male	1.00				1.00			
Female	<b>1.36</b>	<b>1.20</b>	<b>1.55</b>	<b>&lt;0.001</b>	<b>1.35</b>	<b>1.03</b>	<b>1.76</b>	<b>0.031</b>
Grade								
Undergraduates, years 1–3	1.00				1.00			
Undergraduates, years 4–5	<b>0.79</b>	<b>0.65</b>	<b>0.95</b>	<b>0.011</b>	1.03	0.71	1.49	0.895
Graduate students	1.16	0.85	1.60	0.351	0.98	0.50	1.94	0.959
Residence								
Urban	1				1			
Rural	<b>1.14</b>	<b>1.00</b>	<b>1.30</b>	<b>0.043</b>	0.99	0.75	1.29	0.915

AOR, adjusted odds ratio; CI, confidence interval; LL, low level; UL, upper level.

<sup>a</sup>Scores for the Generalized Anxiety Disorder Scale  $\geq 5$ .

<sup>b</sup>Scores for the Generalized Anxiety Disorder Scale  $\geq 10$ .

<sup>c</sup>Provincial confirmed COVID-19 cases 1 day prior to the answering day. Data were from health commissions.

<sup>d</sup>The levels of social support were converted from the total scores for Social Support Rating Scales with terciles as cut points.

Results statistically significant at  $p < 0.05$  level are in bold.

to note that, when using different cutoff points of scales, the epidemic-related factors were not related to moderate to severe depressive or anxiety symptoms. In other words, the impact of the epidemic may only increase mild mental problems in this sample. The elevated symptom severity might be a normal sadness and disturbance response to an unprecedented health crisis (43). Major depressive disorder or general anxiety disorder may be a result of an interaction between genetic factors and lifetime environmental conditions rather than COVID-related factors. Another study found that, compared to people without mental disorders, those with the greatest mental disorder burden had decreased depressive symptoms and worries during the COVID-19 pandemic (43). Pandemic exposure may only be a relatively small stressor for those with poor mental health pre-pandemic. In addition, students living in difficult provincial epidemic conditions expressed more numbness. This feeling seems to be one of the acute stress symptoms caused by the epidemic.

Compared with the epidemic-related factors, factors associated with poor mental health on normal days showed more potent effects. The risk of depressive or anxiety symptoms for medical students with low-level social support was approximately

three times more than those with high-level social support. This result is similar to previous findings among medical students under normal conditions (44). In addition, the association between social support and poor mental health status is consistent with studies conducted among other populations during the COVID-19 pandemic (24–26). Poor mental health status among female medical students was also reported by other studies after COVID-19 (16, 18, 19) or the MERS outbreak (15), while this gender difference was not significant on normal days (40). The lower risk of depression among fourth and fifth year students is consistent with a previous meta-analysis (5). Comparatively, preclinical undergraduates had more curricula to complete and less knowledge about medicine. Some graduate students needed to be engaged and immersed in the clinical environment because of healthcare workforce shortage, and some of them also had to conduct research tasks in their labs.

The findings of this study highlight the importance of improving the social support of medical students. Physical distancing, as a method to avoid virus transmission, also reduces social activities that keep people mentally healthy. Universities and colleges can provide online psychological support, hotline

services, or online courses about psychological preparations for disasters or public crises. When students return to teaching hospitals, they should ensure students' occupational safety, provide supervision, and fully train them on COVID-19. In addition, it is necessary to screen the epidemiological history and mental health status of some high-risk medical students when they return to medical schools or teaching hospitals. Female students, those with low social support, or those who have experienced negative life events associated with the COVID-19 pandemic should receive assistance through possible referrals when the results of screens are positive. Considering our finding that the depressive and anxiety symptoms were generally mild, self-help methods and mental health education programs would also be helpful. Some students had negative feelings, such as anger and hopelessness; thus, emotional expression or management may be important. Furthermore, resilience training (45) can be integrated into medical education to help students become more competent in future health emergency challenges. More infection treatment experience or training may also increase their self-efficacy and intention to provide services or care for patients infected with a newly discovered virus (46).

## Strengths and Limitations

The most significant strength of this study is that, to our knowledge, it is the largest survey on the mental health of medical students at a very unique and important window of time during an emerging communicable disease. Using data from a large country with a strong "lockdown" policy made it possible to explore the association between regional epidemic severity and mental status in a "natural trial." Then, we differentiated personal virus exposure as a "small" environment and provincial epidemic condition as a "large" environment to test their independent impacts. Furthermore, matching personal data with official provincial epidemic data also minimized reporting bias. Finally, this study not only identified the negative mental effects of the outbreak (e.g., depression and anxiety) but also demonstrated the students' positive feelings, such as calmness, providing a complete picture of their experience.

However, there are several limitations. Firstly, the recruitment of participants was conducted through convenience sampling. We could not give a response rate or weigh this sample to increase the representativeness because statistics on national medical students (only majoring in clinical medicine) were not available. The total number of students in medical schools, including students majoring in nursing, pharmacy, or basic medical science, was ~3 million (47). In addition, the infected or virus-exposed medical students may not want to participate in this survey; therefore, the generalization of the rates of depression and anxiety was limited. Secondly, this study did not collect the locations of the medical schools. While most of the students were at home because of the winter vacation, the epidemic condition where their colleges or universities were located could also impact them, for example, through postponement of the return to medical school or a high risk of virus exposure in

teaching hospitals. Thirdly, we did not collect information about their socio-economic status and parents' education level, which may have confounded the results. Finally, an online survey cannot validate the respondents' identities, and self-reports may accompany information bias despite an anonymous data collection process.

In conclusion, nearly one in three Chinese medical students had mild to severe depressive symptoms during the COVID-19 outbreak. Over one-fifth of the patients had mild to severe anxiety symptoms. The risk of depressive or anxiety symptoms for medical students with low social support was higher than those with medium- or high-level social support. COVID-19 exposure increased the risk of depressive and anxiety symptoms. Initial rapid increase in provincial confirmed COVID-19 cases was positively related to mild to severe depressive symptoms. However, COVID-19 exposure and the severity of provincial epidemic conditions were not associated with moderate to severe depressive or anxiety symptoms. Correlates for poor mental status on normal days, such as low social support, female gender, and classification of pre-clerkship or graduates, should be highlighted. Some high-risk medical students need more social support.

## DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because of ongoing analyses. Requests to access the datasets should be directed to chenjx1110@163.com.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board of Beijing HuiLongGuan Hospital. All subjects were informed of an introduction to the study and provided online informed consent before starting the survey.

## AUTHOR CONTRIBUTIONS

JC and YT conceptualized and designed the study. XY, LG, SZ, MQ, and LZ acquired the data. YY analyzed and interpreted the data. YY and JC drafted the manuscript. YT, XY, LG, SZ, MQ, and LZ critically revised the manuscript for important intellectual content. All authors gave final approval of the version and agreed to be accountable for all aspects of the work in ensuring questions related to the accuracy or integrity.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Differential Psychological Factors Associated With Unnecessary Dental Avoidance and Attendance Behavior During the Early COVID-19 Epidemic

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The coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 is challenging the dental community to an unprecedented degree. Knowledge of the increased risk of infection in dental settings has been disseminated to the public and guidelines have been formulated to assist dental attendance decision-making. However, dental attendance behaviors incompatible with treatment need is not uncommon in clinical settings. Important gaps remain in the knowledge about how psychological factors are affecting dental attendance behaviors during the COVID-19 epidemic. In this cross-sectional study, a questionnaire survey was performed during February and March 2020. A total of 342 and 294 dental patients who attended and avoided dental visits, respectively, were included. The participants were classified into four groups based on dental attendance behavior and emergent/urgent dental treatment need. Bivariate analysis was performed to investigate factors associated with dental attendance. Multivariable logistic regression based on principal component scores was performed to identify major psychological constructs associated with unnecessary dental avoidance and attendance. Among all the factors explored, inability to wear masks during dental treatment ( $P < 0.001$ ; effect size: 0.32) was most closely associated with the overall pattern of dental attendance among participants. Multivariable regression suggested that unnecessary dental avoidance was associated with perceived risk of infection in general and in dental settings (odds ratio [95% CI]: 0.62 [0.53, 0.72];  $p < 0.001$ ), perceived impact of COVID-19 and dental problems on general health (0.79 [0.65, 0.97]; 0.021), and personal traits such as trust and anxiety (0.77 [0.61, 0.98]; 0.038). Unnecessary dental attendance was associated with optimism toward the epidemic (1.68 [1.42, 2.01];  $< 0.001$ ) and trust (1.39 [1.13, 1.74]; 0.002). Multidisciplinary efforts involving dental and medical professionals as well as psychologists are warranted to promote more widespread adoption, among the general public, of dental attendance behaviors compatible with dental treatment need during the COVID-19 epidemic.

**Keywords:** dental attendance, dental avoidance, COVID-19 epidemic, psychological characteristics, dental emergency

## INTRODUCTION

The spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a novel strain of coronavirus of zoonotic origin, since its emergence in early December 2019 has resulted in a global pandemic of coronavirus disease 2019 (COVID-19) (World Health Organization, 2020). This has put the dental community against an unprecedented challenge. Dentists and dental patients in clinical settings are at an increased risk of exposure and infection due to the physical proximity between dentists and patients, generation of large volumes of droplets and aerosol during treatment (Cristina et al., 2008), and the inability of the patients to wear masks during treatment. Moreover, patients can be exposed to cross-contamination in the dental office in the absence of adequate precautions (Izzetti et al., 2020). On the other hand, dental problems such as acute pulpitis, acute apical abscess, and traumatic dental injury can lead to extremely painful symptoms and, if left untreated, may develop into life-threatening conditions. Therefore, patients suffering from dental problems are faced with the dilemma of two choices: either visiting dental care providers to alleviate symptoms at the cost of an increased risk of infection or living with symptoms of dental problems at home.

Government and dental professional associations in China and other countries have issued instructions and guidelines regarding the operation of dental services during the COVID-19 epidemic (Ather et al., 2020). In China, all private dental clinics are required to shut down while only selected public dental hospitals to remain open to sustain dental care services for patients in distinct need of emergency treatment. The Chinese government (Li and Meng, 2020; National Health Committee, 2020) and ADA (American Dental Association) formulated guidelines for patient triage and screening and specified the spectrum of emergent/urgent dental diseases that require immediate treatment [American Dental Association (ADA) (2020)]. Both guidelines were developed with the fundamental principle that only patients with emergent/urgent dental problems should be treated and efforts should be made to minimize the risk of contraction of SARS-CoV-2 in the dental office by dental professionals.

In spite of public advocacy of these government policies and professional guidelines, clinical observation suggested that it was not uncommon for patients without emergent/urgent need of dental care to visit dental hospitals. On the other hand, a large number of patients with distinct needs of immediate care refused to visit dental hospitals. These inadequate dental attendance behaviors impede proper prioritization of dental care resources and unnecessarily increase the risk of SARS-CoV-2 exposure and infection by dental professionals and patients. Dental attendance behaviors are evidently influenced by psychological factors. Dental phobia results in irregular dental care-seeking behavior (Bernson et al., 2013). Likewise, pregnant women tend to be hesitant in terms of dental visits although dental care can lead to improved pregnancy outcomes (Al Habashneh et al., 2005; Wrzosek and Einarson, 2009). Consequently, we hypothesize that inadequate dental attendance behavior during the COVID-19 epidemic is influenced by psychological factors.

At the time of writing, limited studies have discussed the impact of the COVID-19 epidemic on dentistry, and even fewer have examined the impact of the epidemic on the psychological status of dental patients. Zhai and Zhou (2020) reviewed dental diseases associated with psychological status and emphasized the need for dentists to pay attention to the psychological status of dental patients. During the SARS outbreak, over 30% of the dental patients in Hong Kong were worried about being infected from dental treatment (Yip et al., 2007). However, only dental attendees were surveyed in this study. Psychological factors associated with dental avoidance and attendance during major disease epidemics cannot be identified from this study. Therefore, the usefulness of this study was limited in terms of informing individualized, targeted psychological interventions that promote the adoption of adequate dental attendance behavior.

In addition to perception toward COVID-19 and perception toward dental visits during this period, coping strategy, anxiety, and trust were also potentially associated with dental attendance behavior. The coping strategy changes the assessment of stress events and regulates physical and emotional responses related to the event (Li et al., 2014). The relationship between individual coping style and mental and physical health has become an important research area in clinical psychology. Previous studies have shown that coping style was related to mental health (Yu et al., 2007). Social anxiety may lead to hesitant behavior, avoidance, and performance difficulties and is therefore potentially associated with reluctant dental-seeking behavior (Maner et al., 2007). In addition, we investigated the trust of the respondents toward others and toward health care workers separately since they may differentially impact dental attendance behavior (Trachtenberg et al., 2005).

The present study aimed at comprehensively assessing psychological factors belonging to multiple domains that influence the attendance behavior of dental patients during the COVID-19 epidemic. Emphasis was placed on psychological factors that are, respectively, associated with unnecessary dental avoidance and attendance. Identification of such psychological determinants would help address inadequate dental attendance behavior and promote widespread adoption of dental attendance behavior compatible with real dental treatment needs of the patients during the COVID-19 epidemic.

## METHODS

### Research Approach

A cross-sectional questionnaire survey was performed to investigate psychological factors associated with dental attendance behavior during the early stage of the COVID-19 epidemic. Analyses were performed separately for each type of dental attendance behavior to investigate how dental attendance behavior is associated with varying psychological factors.

### Procedure and Participants

Participants consisted of 636 adults age 18–80 years who had varying severity of dental diseases during February and March 2020, when the COVID-19 epidemic was at its peak in China. A



**TABLE 1** | Criteria for classification of participants.

	T-V	T-nV	nT-V	nT-nV
Level of pain ≥7/trauma/localized swelling	+	+	-	-
Dental visit	+	-	+	-
Hypothetical question	+	NA	NA	+

For the hypothetical question, participants in group T-V were asked if they would still visit dentists if their symptoms do not constitute dental emergency/urgency. Participants in group nT-nV were asked if they would still avoid visiting dentists if their symptoms constitute dental emergency/urgency.

total of 355 participants who visited the Hospital of Stomatology of Xi'an Jiaotong University, a teaching hospital that remained functional throughout the epidemic period, were recruited. To recruit potential dental patients who did not visit the dental hospital, questionnaires were distributed through WeChat, the largest social media platform in China, covering populations of varying ages, and a total of 946 individuals responded. Among the respondents, 281 were identified as having dental problems and were therefore included in the analysis conducted. Patients were excluded if they themselves or their dependents were unable to cooperate to complete the questionnaire online. Ethics approval was obtained from the Clinical Research Ethics Committee of the Hospital of Stomatology of Xi'an Jiaotong University. Participants gave informed consent prior to their participation.

On the basis of Chinese government policies and guidance from ADA, which are essentially in mutual agreement, we classified participants into four groups according to their emergent/urgent treatment needs and dental attendance behavior (**Table 1**): patients with emergent/urgent dental treatment needs who visited dentists (T-V); patients with emergent/urgent dental treatment needs who did not visit dentists (T-nV); patients without emergent/urgent dental treatment needs who visited dentists (nT-V); and patients without emergent/urgent dental treatment needs who did not visit dentists (nT-nV). Participants in groups T-V and nT-nV demonstrated dental attendance behaviors compatible with their treatment needs and were combined into a single group, termed group C (C for compatible), during further analysis.

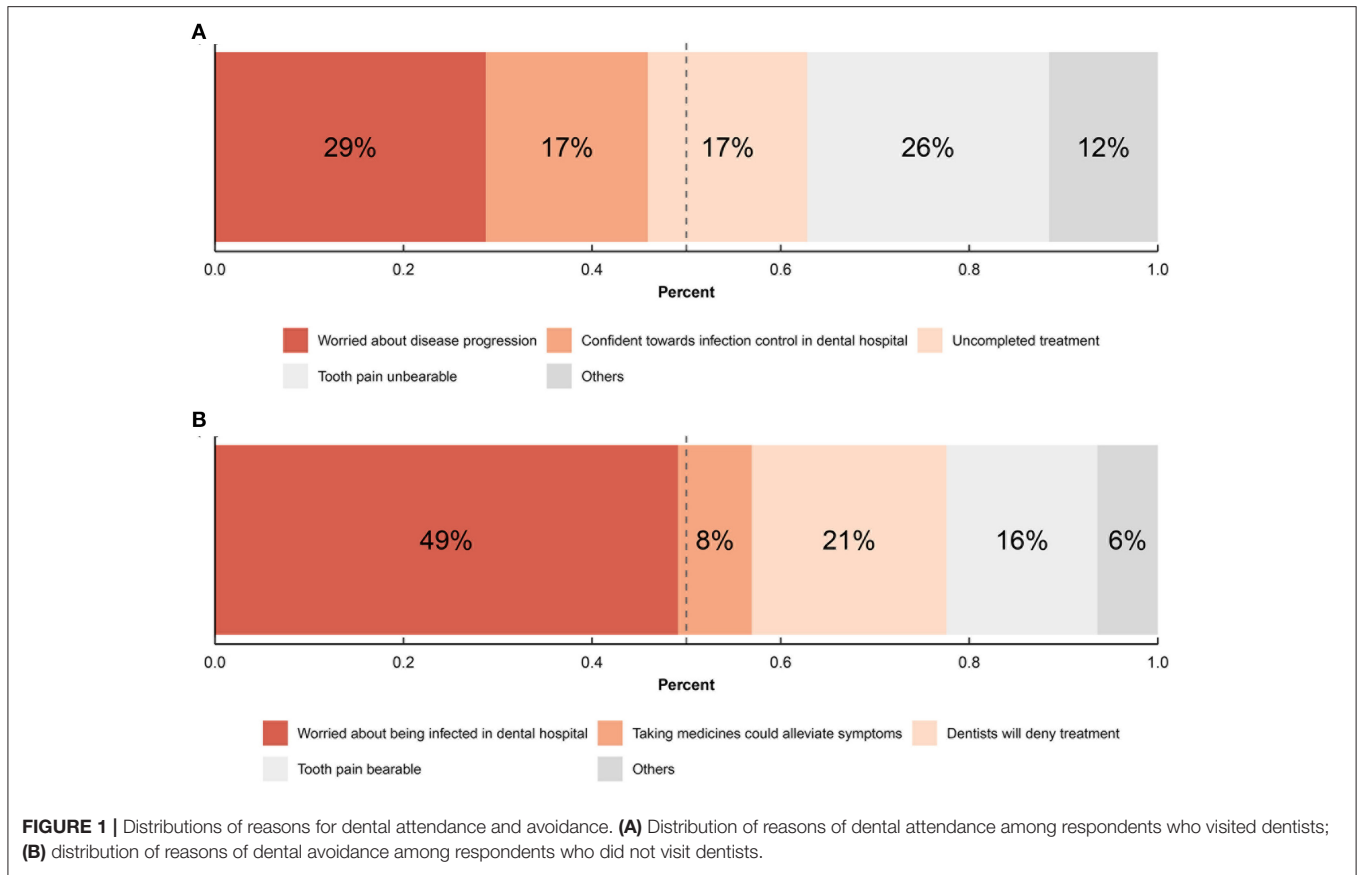
## Measures

All participants responded to the questionnaire (**Supplementary Table 1**) online. The demographic and socioeconomic characteristics of the participants were recorded at the beginning of the questionnaire (Q1–4). The occupation of the participants was classified into occupational groups, namely I (professional), II (managerial and technical), III (skilled), IV (partly skilled), and V (unskilled), according to the Registrar-General's Social Classes (Bland, 1979). Reasons for dental attendance and avoidance were also included (Q6–10). Distribution of participants by reasons of attendance/avoidance

provides an understanding of the impact of psychology-related factors on the dental attendance behavior (**Figure 1**).

The remainder of the questionnaire involved five major domains. The first domain was designed to evaluate the cognition, emotion, and behavior of the participants (Q14–22) to the epidemic. Cognition and emotion significantly affect human behavior (Dolan, 2002). Cognition and emotion-related questions were incorporated into the questionnaire based on questions from a large-scale study on the perception of the general public toward COVID-19 among Chinese citizens (Fang et al., 2020). Cognitive questions involved views on the current status and future trends of the epidemic and knowledge about dental diseases. Emotional questions mainly captured emotional reactions. Behavior-related questions evaluated the perceived impact of the epidemic on daily lives. The second domain investigated knowledge and attitude toward dental attendance during the COVID-19 epidemic based on questions developed by dental experts from different fields (Q23–28). Trust in People Questionnaire (TPQ), which assessed how individuals trust others (Robinson et al., 1973), was included as the third domain of the questionnaire (Q29–35). We additionally included a question (Q32) on the trust of the respondents toward health care providers (Trachtenberg et al., 2005). The Simplified Coping Style Questionnaire (SCSQ) in the fourth domain (Q36–55) of the questionnaire, which assessed individuals' consciousness, purposefulness, and flexibility in regulating behaviors in the real environment, was developed by Xie (1998) on the basis of the Ways of Coping questionnaire by Folkman and Lazarus (1988). SCSQ is a 20-item self-administered questionnaire, including 12 positive response items and 8 negative response items. A higher score represents a more positive/negative coping style. Subjects were asked to indicate their level of agreement on the four-point Likert scale based on the frequency of their adoption of items ranging from 0 ("Never") to 3 ("Very frequent"). The questionnaire has been proven to be reliable and effective and widely used in China (Li et al., 2014). The fifth domain (Q56–62), the Interaction Anxiousness Scale (IAS), assessed the tendency of the subjective social anxiety experience independent of behavior. IAS is a self-reported measure of dispositional social anxiety with proven reliability and validity (Leary and Kowalski, 1993). The IAS contains 15 items, which are answered on a 5-level scale (1 = Does not match me at all; 2 = Matches me a little bit; 3 = Agrees with me to a moderate degree; 4 = Consistent with me; 5 = Very consistent with me). Its total score ranges from 15 (the lowest level of social anxiety) to 75 (the highest level of social anxiety). Cronbach's alpha was calculated for each of the five domains using the "alpha" function from the R package "psych." The values of Cronbach's alpha were 0.61, 0.51, 0.62, 0.85, and 0.79 from the first to the fifth domain, respectively.

A question on the degree of anxiety toward dental visits before the epidemic was used to identify and exclude participants with dental phobia (Q13). A question was designed to exclude all respondents without any dental problems (Q5). It is noteworthy that participants in the T-V group may still visit dentists if their dental conditions were not as emergent/urgent, and *vice versa* for participants in the nT-nV



group. To ensure that the T-V and nT-nV groups included only participants whose perceived need toward dental visit is compatible with the emergency/urgency of the dental condition, two hypothetical questions were asked. In these two questions, participants belonging to the T-V group were asked to indicate if they would still visit dentists if their dental conditions were not emergent/urgent (Q11). A similar question was asked to participants belonging to the nT-nV group (Q12).

## Statistical Analysis

The distribution of participants by demographic and socioeconomic characteristics was described for each behavioral group. The distribution of reasons for dental attendance and avoidance were evaluated. ANOVA was performed to investigate mean differences in response to each question among the four dental attendance behavior groups. The effect size of ANOVA was determined by  $\eta = \sqrt{\frac{SS_M}{SS_T}}$ , where  $SS_M$  is the model sum of square and  $SS_T$  is the total sum of square. Furthermore, response to each question was compared between the T-nV and C groups, as well as between the nT-V and C groups, through planned contrasts. In the first contrast, group T-nV is assigned a weight of 2, nT-V is assigned a weight of 0, T-V and nT-nV are each assigned a weight of -1. This allows for the comparison of groups T-nV and C.

In the second contrast, group T-nV is assigned a weight of 0, nT-V is assigned a weight of 2, and T-V and nT-nV are each assigned a weight of -1. This allows for the comparison of groups nT-V and C. Effect size of planned contrast was determined by  $r = \sqrt{\frac{t^2}{t^2 + df}}$  (Rosenthal, 1994). Following Cohen's guidelines, 0.3 and 0.5 were used as the threshold for small, medium, and large effect for both  $\eta$  and  $r$ , respectively. Categorical variables were compared among and between groups through a chi-square test with effect size estimated through Cramér's  $V$ .

Factors significantly associated with dental attendance behaviors in bivariate analysis (ANOVA and planned contrast) were then jointly examined through multivariable logistic regression. Logistic regression models were established separately for T-nV vs. C and nT-V vs. C. Since items in the questionnaires are not mutually independent, principal component analysis (PCA) was performed to extract principal components (PCs) from those significant items. The "prcomp" function in R was used for the PCA and the calculation of PC scores. Multivariable logistic regression was then performed based on individual PC scores. All tests were two-sided and the level of statistical significance was set at 0.05. ANOVA and logistic regressions were performed using R software (version 4.0.2). The "contrasts" function in R was used for the construction of contrasts and the "aov" function was used for ANOVA. Logistic regressions

**TABLE 2 |** Demographic and socioeconomic characteristics of respondents.

	T-V	T-nV	nT-V	nT-nV
<b>Sex</b>				
Female	103 (52.28%)	82 (54.3%)	93 (58.86%)	76 (58.46%)
Male	94 (47.72%)	69 (45.7%)	65 (41.14%)	54 (41.54%)
<b>Age</b>				
18–29 years	72 (36.55%)	47 (31.13%)	51 (32.28%)	52 (40%)
30–59 years	101 (51.27%)	90 (59.6%)	98 (62.03%)	63 (48.46%)
60–80 years	24 (12.18%)	14 (9.27%)	9 (5.7%)	15 (11.54%)
<b>Education level</b>				
Secondary school or lower	33 (16.75%)	35 (23.18%)	26 (16.46%)	22 (16.92%)
Undergraduate	140 (71.07%)	85 (56.29%)	99 (62.66%)	78 (60%)
Postgraduate	24 (12.18%)	31 (20.53%)	33 (20.89%)	30 (23.08%)
<b>Occupation</b>				
I	28 (14.21%)	26 (17.22%)	33 (20.89%)	28 (21.54%)
II	25 (12.69%)	29 (19.21%)	27 (17.09%)	22 (16.92%)
III	77 (39.09%)	48 (31.79%)	58 (36.71%)	44 (33.85%)
IV	27 (13.71%)	23 (15.23%)	16 (10.13%)	12 (9.23%)
V	40 (20.3%)	25 (16.56%)	24 (15.19%)	24 (18.46%)
<b>Friends being confirmed, suspected, or isolated</b>				
Confirmed	0 (0%)	4 (2.65%)	0 (0%)	0 (0%)
Suspected	3 (1.52%)	2 (1.32%)	1 (0.63%)	0 (0%)
Isolated	3 (1.52%)	3 (1.99%)	0 (0%)	9 (6.92%)
None of the above	191 (96.95%)	142 (94.04%)	157 (99.37%)	121 (93.08%)
<b>Participant being confirmed, suspected, or isolated</b>				
Confirmed	0 (0%)	1 (0.66%)	0 (0%)	0 (0%)
Suspected	0 (0%)	3 (1.99%)	0 (0%)	1 (0.77%)
Isolated	0 (0%)	4 (2.65%)	2 (1.27%)	3 (2.31%)
None of the above	197 (100%)	143 (94.7%)	156 (98.73%)	126 (96.92%)

were performed using the “glm” function with the logit link. All functions used in this study are available in base R.

## RESULTS

### Demographic and Socioeconomic Characteristics

Completed questionnaires were received from 636 surveyed participants. Among the participants, 44% were males. Young people (age 18–30) accounted for 35%, middle-aged people (age 30–59) accounted for 24%, and the elderly (age 60–80) accounted for 10%. There were 63% of respondents who had an undergraduate degree or above. Skilled workers (Occupation group III) had the largest proportion of participants (35.7%) among all occupational categories. The distributions of each characteristic among the four behavioral groups are described in **Table 2**. It was found that 63 and 78% of dental avoidance and attendance behaviors of the participants, respectively, were psychologically related.

**TABLE 3 |** Factors associated with dental attendance during the COVID-19 epidemic.

	Mean difference (SE)	P-value	ES
<b>DOMAIN A: PERCEPTION TOWARD COVID-19</b>			
<b>Q15: Expected duration of the epidemic</b>			
Overall		0.002**	0.15
T-nV vs. C	0.15 (0.09)	0.080	0.07
nT-V vs. C	−0.19 (0.09)	0.01*	0.10
<b>Q16: Worried about being infected</b>			
Overall		<0.001***	0.28
T-nV vs. C	0.26 (0.07)	<0.001***	0.16
nT-V vs. C	−0.29 (0.07)	<0.001***	0.19
<b>Q19: Self-perceived likelihood of being infected</b>			
Overall		<0.001***	0.27
T-nV vs. C	−0.32 (0.07)	<0.001***	0.20
nT-V vs. C	0.18 (0.06)	<0.001***	0.12
<b>Q22: Most dangerous place</b>			
Overall		<0.001***	0.08
T-nV vs. C		<0.001***	0.12
nT-V vs. C		0.12	0.05
<b>DOMAIN B: PERCEPTION TOWARD DENTAL ATTENDANCE DURING COVID-19 EPIDEMIC</b>			
<b>Q23: Impact on dental visit</b>			
Overall		<0.001***	0.31
T-nV vs. C	−0.35 (0.09)	<0.001***	0.18
nT-V vs. C	0.33 (0.09)	<0.001***	0.17
<b>Q24: Degree of fearfulness toward dental visit</b>			
Overall		<0.001***	0.16
T-nV vs. C	−0.17 (0.08)	0.017*	0.10
nT-V vs. C	0.19 (0.07)	<0.001***	0.12
<b>Q26: Unmasking during dental treatment increases likelihood of being infected</b>			
Overall		<0.001***	0.32
T-nV vs. C	−0.36 (0.09)	<0.001***	0.18
nT-V vs. C	0.15 (0.09)	0.25	0.08
<b>Q27: Oral health impacts general health</b>			
Overall		0.08	0.10
T-nV vs. C	0.16 (0.07)	0.01*	0.10
nT-V vs. C	0.06 (0.06)	0.31	0.05
<b>DOMAIN C: TRUST</b>			
<b>Q32: Trust toward health care providers</b>			
Overall		<0.001***	0.23
T-nV vs. C	0.16 (0.06)	<0.001***	0.11
nT-V vs. C	−0.24 (0.06)	<0.001***	0.18
<b>DOMAIN D: COPING</b>			
<b>Positive coping inventory</b>			
Overall		0.001**	0.16

(Continued)

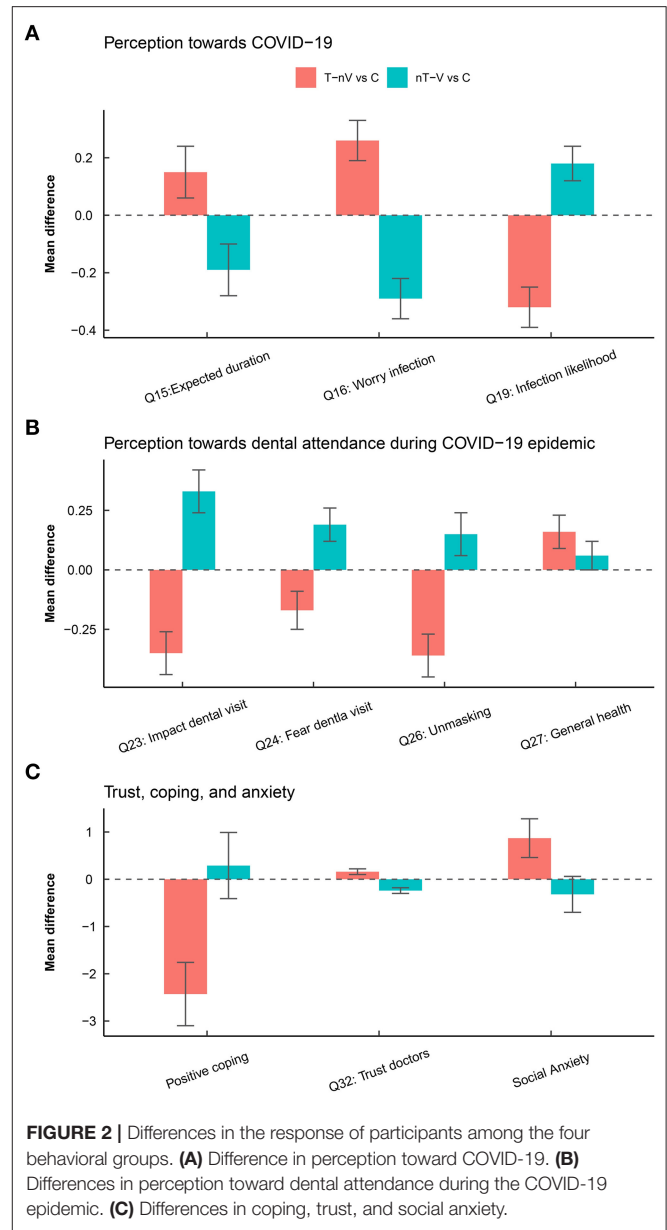
**TABLE 3 |** Continued

	Mean difference (SE)	P-value	ES
T-nV vs. C	-2.43 (0.67)	<0.001***	0.16
nT-V vs. C	0.29 (0.70)	0.68	0.02
<b>DOMAIN E: ANXIETY</b>			
<b>Q56: Trait anxiety</b>			
Overall		<0.001***	0.12
T-nV vs. C		0.002**	0.13
nT-V vs. C		0.14	0.06
<b>Social anxiety inventory</b>			
Overall		0.008**	0.14
T-nV vs. C	0.87 (0.41)	0.01*	0.10
nT-V vs. C	-0.32 (0.38)	0.24	0.04

Mean differences were presented for all questions except for questions with categorical responses. SE, standard error; ES, effect size. When groups T-nV and nT-V are compared against group C, mean values for group C were subtracted from those for groups T-nV and nT-V, respectively. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

### Factors Associated With the Pattern of Dental Attendance During the COVID-19 Epidemic

The ANOVA and planned contrast identified factors associated with dental attendance behavior from each of the five domains in the questionnaire (Table 3, Figure 2). The behavior of being worrisome about getting infected was most closely associated with the overall pattern of dental attendance ( $P < 0.001$ ; ES = 0.28) and was significantly associated with both unnecessary dental avoidance ( $<0.001$ ; 0.16) and attendance ( $<0.001$ ; 0.19). Perceived likelihood of being infected was likewise associated with both unnecessary dental avoidance ( $<0.001$ ; 0.20) and attendance ( $<0.001$ ; 0.12) behaviors. The expected epidemic duration was uniquely associated with unnecessary dental attendance behavior (0.01; 0.10). Considering dental hospital to be the most dangerous place was uniquely associated with dental avoidance behavior ( $<0.001$ ; 0.12). Perceived impact of the epidemic on dental visits ( $<0.001$ ; 0.31) and degree of fearfulness toward dental visits ( $<0.001$ ; 0.16) were associated with the general pattern of dental attendance. Unmasking during dental visits was most closely associated with the pattern of dental attendance ( $<0.001$ ; 0.32) but further analysis revealed that it was only associated with unnecessary dental avoidance ( $<0.001$ ; 0.18). The perceived impact of oral health on general health was significantly associated with only unnecessary dental avoidance (0.01; 0.10). Trust toward health care providers was associated with both unnecessary dental avoidance ( $<0.001$ ; 0.11) and attendance ( $<0.001$ ; 0.18). Positive coping, on the other hand, was uniquely associated with unnecessary dental avoidance ( $<0.001$ ; 0.16). In terms of anxiety, trait anxiety (0.002; 0.13) and social anxiety (0.01; 0.10) were uniquely associated with unnecessary dental avoidance. Table 3 suggests that participants who avoided necessary dental visits differed from group C in the reverse direction in which participants who unnecessarily visited dental hospitals differed from group C.



Multivariable logistic regression based on group T-nV and group C (Table 4, Supplementary Table 2) suggested that higher PC1 scores, which represented a lower perceived risk of SARS-CoV-2 infection in dental hospitals, was associated with reduced likelihood of unnecessary dental avoidance (odds ratio [95% CI]: 0.62 [0.53, 0.72];  $p < 0.001$ ). Participants with higher scores along PC3, which was indicative of the less perceived impact of COVID-19 and greater impact of dental problems toward general health, were less likely to avoid necessary dental visits (0.79 [0.65, 0.97]; 0.021). PC6, which was associated with positive personal traits such as the adoption of positive coping and less social anxiety, was associated with reduced likelihood of unnecessary dental avoidance (0.77 [0.61, 0.98]; 0.038). Multivariable logistic regression based on group nT-V and group



**TABLE 4 |** Multivariable associations between principal components of psychological factors and dental avoidance.

	OR (95% CI)	P-value
PC1 (Perceived increased risk of SARS-CoV-2 infection in dental hospital)	0.62 (0.53, 0.72)	<0.001***
PC2	1.13 (0.95, 1.34)	0.175
PC3 (Perceived relative importance of COVID-19 vs. dental problems on general health)	0.79 (0.65, 0.97)	0.021*
PC4	0.87 (0.71, 1.07)	0.188
PC5	0.90 (0.73, 1.12)	0.366
PC6 (Personal trait)	0.77 (0.61, 0.98)	0.038*
PC7	1.06 (0.84, 1.35)	0.626
PC8	0.91 (0.70, 1.19)	0.491
PC9	1.05 (0.79, 1.40)	0.718

OR, odds ratio; 95% CI, 95% confidence interval. Participants in group C were coded as 0 and in group T-nV were coded as 1. \* $p < 0.05$ ; \*\*\* $p < 0.001$ .

**TABLE 5 |** Multivariable associations between principal components of psychological factors and unnecessary dental attendance.

	OR (95% CI)	P-value
PC1 (Judgement of COVID-19 epidemic)	1.68 (1.42, 2.01)	<0.001***
PC2 (Trust toward others)	1.39 (1.13, 1.74)	0.002**
PC3	0.89 (0.71, 1.11)	0.310
PC4	0.98 (0.79, 1.21)	0.840
PC5	0.99 (0.78, 1.26)	0.914
PC6	1.03 (0.80, 1.34)	0.813

OR, odds ratio; 95% CI, 95% confidence interval. Participants in group C were coded as 0 and in group nT-V were coded as 1. \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

C (Table 5, Supplementary Table 3) suggested that higher PC1 scores, indicative of a positive perception toward the COVID-19 epidemic, increased the likelihood of unnecessary dental attendance (1.68 [1.42, 2.01]; <0.001). PC2, which accounted for increased trust toward health care providers and less fearfulness toward dental visits, increased the likelihood of unnecessary dental visits by 39% (1.39 [1.13, 1.74]; 0.002).

## DISCUSSION

To the knowledge of the authors, this is the first study that has comprehensively investigated the impact of psychological factors on the patterns of dental attendance behavior during the COVID-19 epidemic. By separately analyzing psychological factors influencing unnecessary dental avoidance and attendance, we were able to provide evidence on psychological factors that differentially influence these two dental attendance behaviors.

This study was performed in the city of Xi'an, a prominent city in northwest China whose epidemiological profile of COVID-19 ranked middle among all major cities in China. The study was performed during February and March when the COVID-19 epidemic was at its height in China. Distributions of demographic

and socioeconomic characteristics were comparable across the four groups of participants. The findings presented herein are therefore generalizable to the local population. However, care should be taken when extrapolating the present findings to the wider population because differences in the degree of severity of COVID-19 may interact with psychological determinants to affect dental attendance behavior. Whether and how cultural and socioeconomic differences across regions and nations impact dental attendance behavior in addition to psychological factors is worthy of further investigation.

Dental care-seeking behavior is most commonly influenced by dental symptoms. However, the impact of psychological factors on dental attendance should not be neglected. The presented findings suggest that the dental avoidance and attendance behavior of more than half of the participants during the COVID-19 epidemic was psychologically related. This highlighted the importance of psychological factors on dental visits during the COVID-19 epidemic.

Further analyses revealed that participants who unnecessarily avoided dental visits responded to these questions in the reverse direction in which those who unnecessarily attended dental visits responded. This lends further support to the regulatory role of psychological factors in driving dental attendance behaviors. Such findings also justified the need to analyze the groups T-nV and nT-V separately. However, a close examination revealed that factors leading to unnecessary dental avoidance and attendance were not exactly the same. This points toward the complex pathways in which multiple psychological factors interact and ultimately affect dental attendance behaviors.

Multivariable logistic regression identified three components that were associated with unnecessary dental avoidance behavior. The first component characterized individual perception toward the risk of infection both in general and inside dental hospitals. Knowledge about the routes and dynamics of SARS-CoV-2 transmission was limited during the early stage of the COVID-19 epidemic, which resulted in prevalent anxiety and a feeling of uncertainty among the general public. It was estimated that around 70% of the public were worried or terrified of the epidemic. This creates the possibility for cognitive bias to prevail among the general public (Fang et al., 2020). Chinese health authorities have advised the public to use masks since the early stage of the epidemic. Compared to individuals in other countries, especially westerners, masks are given greater importance in their role in individual protection during the COVID-19 epidemic by Chinese individuals. This likely explains the contribution of worry toward unmasking during dental treatment to the first component. As a result, perception toward the epidemic and toward dental visits jointly influenced unnecessary dental avoidance behavior. Dissemination of the knowledge of COVID-19 and timely updates of epidemic status could help relieve the feeling of uncertainty and terror by the general public. Dental patients should be educated that necessary dental treatment should nevertheless be delivered as long as necessary precautions are taken. The strict measures of infection control taken by the dental hospitals should be made aware to the public. Education of this kind could serve as a strategy during cognitive behavioral therapy to help those who would

have avoided dental visits to assume a more evidence-based stance toward COVID-19 that is less affected by cognitive bias.

The perceived risk of COVID-19 and dental problems toward general health also impacted dental avoidance. Individuals avoiding necessary dental visits tended to overestimate the impact of COVID-19 and underestimate the impact of dental problems on general health. Expert opinions converge to indicate an uncertain to low risk of SARS-CoV-2 infection in dental hospitals under the condition of adequate precautionary measures taken by both dental hospitals and dental patients. In contrast, there exists a real and distinct risk for dental emergencies to progress into a general health threat. Therefore, to correct for the misjudgment of patients, coordinated efforts from medical and dental health care workers are required to disseminate evidence-based knowledge of the impact of both COVID-19 and dental problems on general health; the emphasis should be placed on the impact of both COVID-19 and dental problems on general health during the consultation and psychological intervention. Greater awareness of general health impact from both aspects would enable the general public to make better-informed dental visit decisions and reduce unnecessary dental avoidance.

Another component associated with dental avoidance involved coping and anxiety. Coping styles directly impact the emotional and physical outcomes of stressful events (Beutler et al., 2011). Positive coping styles affect emotional regulation and facilitate behavioral regulation (Iwata, 2002; MacNeil et al., 2012). A meta-analysis suggests that coping style plays an important role in deciding whether to accept medical and psychological therapeutic interventions (Glanz et al., 2008; Beutler et al., 2011). During the SARS epidemic, positive coping was found to be associated with increased willingness to accept medical treatment and decreased incidence of mental illness (Sim et al., 2010). The findings by the authors likewise identified an association between dental attendance behavior and positive coping, which expands the current knowledge on the impact of coping styles on treatment-related decision-making. Furthermore, the observed findings suggest that strategies that boost positive coping, such as meditation and exercise, may play an essential role in alleviating stress and reducing trepidation. Social anxiety, on the other hand, may lead to hesitant behavior, avoidance, and performance difficulties (Oakman et al., 2003). Increased social anxiety is therefore associated with more frequent unnecessary dental avoidance.

Multivariable logistic regression identified two components associated with unnecessary dental attendance. The first component reflected optimism/pessimism toward the COVID-19 epidemic. Participants unnecessarily attending dental visits were more likely to be optimistic toward the epidemic. Although such optimism is not to be discouraged, proper education is necessary for this population so that limited dental care resources are more effectively delivered to those truly in need. In addition, the presence of this group of population in dental hospitals highlights the importance of the unrelenting effort in infection control in dental hospitals to prevent nosocomial spread of infection because these overly optimistic patients are more likely to be ignorant regarding personal protection. Another

component associated with unnecessary dental attendance was trust toward health care providers and the resultant decrease in fear of dental attendance. Like optimism, trust toward health care provides is in no way to be discouraged; better education of the risks of unnecessary dental attendance during the COVID-19 epidemic is critical to this population.

The observed findings suggest that cognitive regulation and knowledge dissemination would help the general public adopt dental attendance behaviors compatible with their real treatment needs. In addition, the promotion of the infection control measures taken by dental hospitals could help offset the perceived risk of unmasking during dental treatment to reduce unnecessary dental avoidance. Methods to boost coping behaviors are also likely to reduce unnecessary dental avoidance. Education about the risk of dental attendance is important in restraining those who planned unnecessary dental visits at home. All of the above strategies require efforts by dental professionals, as well as medical and psychological experts, to actively engage in the decisions of patients toward dental visits. Websites and hotlines maintained by professionals may provide a means to identify the need of each individual so as to develop individualized opinions and, when necessary, psychological interventional strategies, to better serve the general public.

Several limitations of the study bear noting. First, trait anxiety and the perception of the dental hospital being the most dangerous place in terms of being infected were not included in multivariable logistic regression although they were found to be significantly associated with patterns of dental attendance. This is because the answers to these two questions are categorical instead of ordinal or continuous. There is no way in which these questions could be included in PCA. However, we have included other questions of the same domain as these two questions, and hence, the results are not likely to be significantly biased. Second, the findings may be subject to the reporting bias of participants. Classification of dental patients who avoided dental visits with regard to emergent/urgent treatment need was performed purely based on self-reported signs and symptoms. This constitutes a potential source of bias since the rating of the severity of pain may be subject to subjectivity and recall bias. Besides, since the participants of this study were suffering from varying severities of dental symptoms, their response to the questionnaire may be biased by an emotional response to dental symptoms. We included two hypothetical questions at the outset that required participants to indicate their likely dental attendance decision if the severity of their symptoms is different. These hypothetical questions required the devotion and thinking of the participants, which could help the participants calm down and respond to the rest of the questionnaire more sensibly. Third, factors that may influence the strength of the impact of psychological factors on dental attendance behaviors, such as regional level of risk, medical history, and the number of visits, were not taken into consideration. Inclusion of these factors in future studies is likely to produce more robust findings unaffected by variations in these variables. Fourth, the domain of "Perception toward dental attendance during COVID-19 epidemic" is composed of questions that have not been previously validated. These questions were prepared by the joint effort of a team of dental

specialists and psychologists with experience in questionnaire development. However, Cronbach's alpha suggested a lower level of internal consistency for this domain relative to other domains. The level of internal consistency is not unacceptable (Cronbach's alpha of  $<0.5$  is considered unacceptable) but we do acknowledge that better-structured questionnaires would provide more valid and robust findings. Given the timeliness of this study, the presented findings are still useful in identifying psychological factors associated with dental attendance during the COVID-19 epidemic.

## CONCLUSION

Psychological factors play an important role in influencing dental attendance behavior during the COVID-19 epidemic. The perceived risk of SARS-CoV-2 infection in general and in dental hospitals, the perceived impact of COVID-19 and dental problems on general health, and personal traits such as coping style and anxiety influence unnecessary dental avoidance. Unnecessary dental attendance, on the other hand, is driven by optimism/pessimism toward the COVID-19 epidemic and trust toward health care providers. Multidisciplinary efforts are required to better educate and serve the general public and to promote more widespread adoption of dental attendance behavior compatible with dental treatment needs during the current COVID-19 epidemic.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Clinical Research

Ethics Committee of Hospital of Stomatology of Xi'an Jiaotong University. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

YW collected data, performed the statistical analysis, and drafted the manuscript. PF collected data, performed the statistical analysis, and revised the manuscript. J-xP, SW, and XL designed the questionnaire, participated in statistical analysis, and critically reviewed the manuscript. QD conceived the study, designed the study, supervised the data collection process, advised on statistical analysis, and critically revised the manuscript. All authors agree to be accountable for the content of the work.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.555613/full#supplementary-material>

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# Worries, Preparedness, and Perceived Impact of Covid-19 Pandemic on Nurses' Mental Health

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**Background:** In times of global public health emergency, such as the COVID-19 pandemic, nurses stand at the front line, working in close contact with infected individuals. Being actively engaged in fighting against COVID-19 exposes nurses to a high risk of being infected but can also have a serious impact on their mental health, as they are faced with excessive workload and emotional burden in many front-line operating contexts.

**Purpose:** The aim of the study is to analyze how risk factors such as perceived impact, preparedness to the pandemic, and worries were associated with mental health outcomes (crying, rumination and stress) in nurses.

**Methods:** A cross-sectional study design was performed via an online questionnaire survey. Participants included 894 registered nurses from Italy. Participation was voluntary and anonymous. Multiple binary logistic regression was carried out to analyze the relationship between risk factors and health outcomes.

**Results:** Increased job stress was related to higher levels of rumination about the pandemic (OR = 4.04,  $p < 0.001$ ), job demand (OR = 2.00,  $p < 0.001$ ), impact on job role (OR = 2.56,  $p < 0.001$ ), watching coworkers crying at work (OR = 1.50,  $p < 0.05$ ), non-work-related concerns (OR = 2.28,  $p < 0.001$ ), and fear of getting infected (OR = 2.05,  $p < 0.001$ ). Job stress (OR = 2.52,  $p < 0.01$ ), rumination (OR = 2.28,  $p < 0.001$ ), and watching colleagues crying (OR = 7.92,  $p < 0.001$ ) were associated with crying at work. Rumination was associated with caring for patients who died of COVID-19 (OR = 1.54,  $p < 0.05$ ), job demand (OR = 1.70,  $p < 0.01$ ), watching colleagues crying (OR = 1.81,  $p < 0.001$ ), non-work-related worries (OR = 1.57,  $p < 0.05$ ), and fear of getting infected (OR = 2.02,  $p < 0.001$ ).

**Conclusions:** The psychological impact that this pandemic may cause in the medium/long term could be greater than the economical one. This is the main challenge that health organizations will have to face in the future. This study highlights that the perceived impact and worries about the pandemic affect nurses' mental health and can

impact on their overall effectiveness during the pandemic. Measures to enhance nurses' protection and to lessen the risk of depressive symptoms and post-traumatic stress should be planned promptly.

**Keywords:** COVID-19 pandemic, nurses, stress, health outcomes, risk factors, perceived impact

## INTRODUCTION

The Coronavirus Disease (COVID-19) pandemic represents a serious concern for public and occupational health (1). This pandemic is having an unprecedented impact on the nursing profession. According to the World Health Organization, nurses represent the largest group of Health Care Workers (HCWs) involved on the front line of health care systems. In this sense, nurses deliver care to patients in close physical proximity and thus they are directly exposed to the virus and are at high risk of developing the disease (2–4). To protect HCWs, physical distancing in taking care of COVID-19 patients can limit the spread of the infection, although it reduces nurses' ability to meet the patients' needs. However, during the first months of the pandemic, the European Center for Disease Control and Prevention (ECDC) (5) announced that up to 10% of the reported cases in China and up to 9% of all cases in Italy were among HCWs. According to the CDC (6) in the US the percentage of positive cases among HCWs ranged from 3 to 11%. However, due to the preventive measures, the infection risk among HCWs gradually decreased (7). What rapidly became important was to preserve the mental health of HCWs (8), challenged by the tremendous psychosocial crisis they were experiencing (9–11).

In pandemic scenarios, all HCWs are at risk of long working hours, higher job demands, psychological distress, fatigue, stigmatization, and physical and psychological violence (2). Studies showed the impact of this critical situation on HCWs' mental health in terms of worries, fatigue, insomnia, anxiety, depression, and stress (8, 11–13). Moreover, the increased percentage of patient deaths results in an augmented exposure to emotional and psychological suffering: a recent systematic review on HCWs' mental health during the COVID-19 pandemic found an anxiety incidence of 24.6%, a depression incidence of 22.8%, and an insomnia incidence of 34.3% (14). Regarding the psychological impact of the outbreak, the literature points out a prevalence of post-traumatic stress disorder (PTSD) among HCWs between 11 and 73.4% (15). The continuous exposure to stressful events may result in post-traumatic stress symptoms, which, in turn, may mine professionals' ability to cope with the situation. As to the nursing profession, previous studies investigating the impact of outbreaks/pandemic showed that the more nurses perceived risks for their health, the more they left their job (16–18). Furthermore, those who did not leave were exposed by the pandemic scenario to higher levels of distress, increased workload, emotional burden, workplace conflicts, increased depression risk, and suicide (19, 20). In a recent literature review investigating the impact of respiratory pandemic on nurses, Fernandez et al. (21) reported that nurses experienced fear, worries for personal and family safety, a sense of powerlessness, increased job demands, anxiety, and stress.

Furthermore, perceived organizational preparedness and safety played a crucial role.

In this sense, preserving nurses' mental health during the COVID-19 pandemic is a very important global challenge as it may increase health systems' ability to deliver timely care. Worries and emotional impact of the COVID-19 pandemic among nurses are still barely analyzed. Most of the available studies on the topic usually include physicians or other health care professionals (22). In relation to the peculiarities of its professional mandate and the current organization of the Italian health care service, the nursing profession is facing this critical situation in a transversal way, in different care contexts. Moreover, nurses are faced with an excessive workload and emotional burden in many front-line operating realities, even compared to the actual available resources (23). In Italy, in the first months of the pandemic, 25,629 health workers were infected with Covid-19 (24), including 12,000 nurses (25). In addition, of the 80 health workers who died (16), 39 were nurses, four of whom committed suicide (25). To our knowledge, there is no Italian study analyzing nurses' mental health perception during this pandemic, because most of the COVID-19-related research includes Asian samples (26). Therefore, this study would contribute to expand the knowledge on the topic and provide additional value to the existing studies.

## STUDY AIM

The aim of the study was to analyze how the perceived impact, preparedness to the pandemic, and worries are associated with mental health indicators (crying, rumination, and stress) in nurses.

## MATERIALS AND METHODS

### Study Design, Participants, and Data Collection

A cross-sectional study design was performed via an online questionnaire survey. Participants included registered nurses from Italy. The only inclusion criterion was to be working during the COVID-19 pandemic. To collect data, the LimeSurvey application was implemented and the link to the questionnaire was shared through social networking platforms. Participants were briefed about the study purpose through written information reported on the questionnaire's homepage. Informed consent was obtained from all nurses before filling out the online questionnaire. Privacy was assured because no IP address was registered and no sensitive data were requested. The data were collected from April 15th to April 24th 2020.

## Ethical Statement

The study complies with the Declaration of Helsinki and with the General Data Protection Regulation (EU) 2016/679 (GDPR). Participation was voluntary and anonymous, according to Italian Data protection law (e.g., Decree n. 196/2003). Participants could interrupt their participation in the survey at any time without any adverse consequence. We consulted the Institutional Review Boards of the University of Cagliari, which informally said that Ethical review and approval was not required for the study on human participants, in accordance with the local legislation and institutional requirements.

## Measures

The online self-report questionnaire consisted of two sections. The first one regarded demographic information including gender, age, working geographical area, civil status, children, current clinical-healthcare area, job description, and professional tenure. The second one was developed by combining items from different questionnaires. Specifically, we used measures from previous international studies on other epidemics (SARS and Avian Influenza) (27, 28) to assess worries, preparedness and impact of the COVID-19 pandemic among nurses. The aim was to use a short survey to avoid cognitive overloading for workers. In this sense, items unsuitable for the target work population were not selected. Also, we used Ruminations on Sadness Scale (29, 30) to measure nurses' ruminations about the pandemic. Finally, we measured the frequency of crying at work and watching one's own colleagues crying at work. For the scales that did not have an Italian version, cultural adaptability of the items was assured via translation and back-translation procedures (31). Two bilingual experts independently translated the questionnaire from English into Italian. The two translations were then compared to identify and discuss the main inconsistencies. After this revision, a final Italian version of the questionnaire was created. Then, the translated questionnaire was back-translated into English by another bilingual linguistic expert to evaluate equivalence. Finally, the back-translated version of the questionnaire was compared with the original version. Meanings and concepts were considered as equivalent. A pre-test was carried out on 10 nurses to assess the appropriateness of the translation, comprehensibility and clarity of the items, and time of completing questionnaire.

Regarding the specific measures considered into the whole questionnaire, we investigated the following variables: (1) organizational preparedness (1 item) and Regional Health System (RHS) preparedness (3 items). A sample item was "My hospital RHS has a preparedness plan for the COVID-19 pandemic"; (2) personal preparedness (1 item: "I am personally prepared for the COVID-19 pandemic"); (3) fear of getting sick with COVID-19 (2 items: "I am afraid of falling ill with COVID-19"); (4) non-work-related concerns (3 items: "People close to me are at high risk of getting COVID-19 because of my job"); (5) increased job demands (3 items: "I had an increase in workload in my job") and job role (1 item: "I would had to do work not normally done by me"); (6) impact on personal life (3 items: "People avoid me because of my job"); (7) perceived job stress (1 item: "I feel more stressed at work"). Ruminations about the

pandemic was measured by adapting 2 items from the Italian version of Ruminations on Sadness Scale changing "sadness" with "pandemic" (e.g., "I have difficulty getting myself to stop thinking about this pandemic") (29, 30). Finally, 2 items were *ad hoc* developed to measure the frequency of crying at work and watching one's own colleagues crying at work (e.g., "I have been crying at work because I felt like I could not take it anymore"). Cronbach's Alpha was calculated for the scales with at least three items. For the measures with two items, inter-item correlation was performed. All the items were based on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

## Statistical Analysis

To performing data analysis, the SPSS (IBM, Chicago, IL, USA) version 23.0 was used. Descriptive analyses such as frequencies, percentages, mean and standard deviation, and median and interquartile range (IQR) were carried out to analyze the descriptive characteristics of the sample for the study variables. Multi-item scores were computed by calculating the mean of the items in each scale. All the study variables were divided in low/high rate for the variable. The central point (=3) of the rating scale was considered as the cut-off criteria: the values  $\leq 3$  were rated as 0 (low) and those  $\geq 3$  were rated as 1 (high). Mann-Whitney *U* and Pearson chi-square ( $\chi^2$ ) tests were performed to compare sub-groups of the sample by discriminating for work context (frontline/non-frontline) and for presence/absence of patients who died of COVID-19. Frequencies and percentages for the variables regarding the work history (working geographical area, working area, and professional tenure) and demographic characteristics (gender, age, civil status, and children) of the participants, were compared to detect possible differences between groups. Also, we explored differences between groups of age ( $\leq 45$  and  $> 45$  years old), family status (single, conjugate, divorced, widower, and other), work geographical area (North-Center and South-Islands), and work context (frontline/non frontline) with regard to social ostracism (low/high), non-working concerns (low/high), concern for friends (non-worried/worried), concern for colleagues (non-worried/worried), concern for patients (non-worried/worried). Cut-off for age was defined based on sample distribution in percentiles, namely considering all the individuals who were below and above the 50<sup>th</sup> percentile. Crying at work, ruminations, and perceived stress were identified as potential risk outcomes for health among nurses. Perceived impact, preparedness for the pandemic, and worries were considered as main risk factors. To analyze the risk factors on health outcomes, multiple binary logistic regression was carried out by reporting odds ratios (ORs) and 95% Confidence Intervals (CI). The model was adjusted for gender, age, frontline/non-frontline nurse, and caring/non-caring for patients who died of COVID-19. These variables were considered as potential confounders. The significance level was set at  $p = 0.05$ .

About the instrument reliability, Cronbach's alpha coefficients for RHS preparedness was 0.80, for non-work-related concerns was 0.66, for increased job demands was 0.74, and for perceived impact on personal life was 0.74. Inter-item correlations were all significant at  $p < 0.001$ . Specifically, inter-item correlation

**TABLE 1** | Differences between frontline and non-frontline nurses on both demographic and job characteristics.

Variable	Non-frontline nurse	Frontline nurse	p-value
Gender			
Male, <i>n</i> (%)	92 (19.2)	100 (26.2)	0.014 <sup>a</sup>
Woman, <i>n</i> (%)	387 (80.8)	281 (73.8)	
Median age (IQR)	48.0 (33.0–60.0)	43.0 (32.0–57.0)	<0.001 <sup>b</sup>
Age (range)			
<30 years, <i>n</i> (%)	73 (15.2)	69 (18.1)	<0.001 <sup>a</sup>
30–39 years, <i>n</i> (%)	89 (18.6)	98 (25.7)	
40–49 years, <i>n</i> (%)	107 (22.3)	113 (29.7)	
50–59 years, <i>n</i> (%)	183 (38.2)	92 (24.1)	
≥60 years, <i>n</i> (%)	27 (5.6)	9 (2.4)	
Working geographical area			
Northern or Central Italy, <i>n</i> (%)	132 (27.6)	209 (54.9)	<0.001 <sup>a</sup>
Southern Italy or Islands, <i>n</i> (%)	347 (72.4)	172 (45.1)	
Family status			
Single, <i>n</i> (%)	176 (36.7)	171 (44.9)	0.009 <sup>a</sup>
Married, <i>n</i> (%)	231 (48.2)	145 (38.1)	
Divorcee, <i>n</i> (%)	29 (6.1)	34 (8.9)	
Widower, <i>n</i> (%)	6 (1.3)	1 (0.3)	
Other, <i>n</i> (%)	37 (7.7)	30 (7.9)	
Children			
Yes <i>n</i> (%)	264 (55.1)	180 (47.2)	0.022 <sup>a</sup>
No <i>n</i> (%)	215 (44.9)	201 (52.8)	
Workplace area			
Hospital, <i>n</i> (%)	334 (69.7)	350 (91.9)	<0.001 <sup>a</sup>
Territorial service, <i>n</i> (%)	81 (16.9)	27 (7.1)	
Other, <i>n</i> (%)	64 (13.4)	4 (1.0)	
Professional tenure (median and IQR)	24.0 (7.0–37.0)	16.0 (7.0–35.0)	0.001 <sup>b</sup>

IQR, Interquartile Range. <sup>a</sup>Pearson chi-square test. <sup>b</sup>Mann–Whitney U-test.

**TABLE 2** | Differences between nurses who cared for and nurses who did not care for patients who died of COVID-19 on both demographic and job characteristics.

Variable	Non-caring for patients who died of COVID-19	Caring for patients who died of COVID-19	p-value
Gender			
Male, <i>n</i> (%)	114 (20.3)	78 (26.2)	0.048 <sup>a</sup>
Woman, <i>n</i> (%)	448 (79.7)	220 (73.8)	
Median age (IQR)	47.5 (34.0–60.0)	42.5 (32.0–56.0)	<0.001 <sup>b</sup>
Age (range)			
<30 years, <i>n</i> (%)	84 (14.9)	58 (19.5)	<0.001 <sup>a</sup>
30–39 years, <i>n</i> (%)	114 (20.3)	73 (24.5)	
40–49 years, <i>n</i> (%)	130 (23.1)	90 (30.2)	
50–59 years, <i>n</i> (%)	204 (36.3)	71 (23.8)	
≥60 years, <i>n</i> (%)	30 (5.3)	6 (2.0)	
Working geographical area			
Northern or Central Italy, <i>n</i> (%)	133 (23.7)	208 (69.8)	<0.001 <sup>a</sup>
Southern Italy or islands, <i>n</i> (%)	429 (76.3)	90 (30.2)	
Family status			
Single, <i>n</i> (%)	219 (39.0)	128 (43.0)	0.158 <sup>a</sup>
Married, <i>n</i> (%)	260 (46.3)	116 (38.9)	
Divorcee, <i>n</i> (%)	37 (6.6)	26 (8.7)	
Widower, <i>n</i> (%)	6 (1.1)	1 (0.3)	
Other, <i>n</i> (%)	40 (7.1)	27 (9.1)	
Children			
Yes, <i>n</i> (%)	302 (53.7)	142 (47.7)	0.089 <sup>a</sup>
No, <i>n</i> (%)	260 (46.3)	156 (52.3)	
Working area			
Hospital, <i>n</i> (%)	409 (72.8)	275 (92.3)	<0.001 <sup>a</sup>
Territorial service, <i>n</i> (%)	91 (16.2)	17 (5.7)	
Other, <i>n</i> (%)	62 (11.0)	6 (2.0)	
Professional tenure (median and IQR)	23.5 (8.0–37.0)	15.0 (6.0–35.0)	<0.001 <sup>b</sup>

IQR, Interquartile Range. <sup>a</sup>Pearson chi-square test. <sup>b</sup>Mann–Whitney U-test.

for fear of getting sick with COVID-19 was 0.37, for rumination about the pandemic was 0.76, and for crying at work was 0.52.

## RESULTS

A total of 894 nurses completed the questionnaire. However, 34 nurses who were not actively at work at the time of the study had to be excluded from it. Thus, the final sample for this study consisted of 860 nurses, most of whom were women (77.7%, *n* = 668). Regarding age, the larger proportion ranged from 50 to 59 years (32%, *n* = 275). The majority of respondents worked in southern Italy or on one of the Islands (60.3%, *n* = 519), had an average professional tenure of 18.5 years (SD = 11.6), worked in hospital context (79.5%, *n* = 684), had children (51.6%, *n* = 444), and was married (43.7%, *n* = 376). Furthermore, 44.3% (*n* = 381) were frontline nurses working in a COVID-19 emergency unit. Finally, 32.7% of nurses (*n* = 281) attended training courses and 17.2% (*n* = 148) attended audits on infection control in the 6 months before the pandemic; 26.7% (*n* = 230)

purchased personal protective equipment; 34.7% (*n* = 298) cared for patients who died of COVID-19.

## Nurses' Descriptive and Job Characteristics

Tables 1, 2 show both the demographic and the job characteristics of the sample. We split the sample into frontline/non-frontline nurses and caring/non-caring for patients who died of COVID-2019. Specifically, Table 1 shows significant differences between frontline and non-frontline nurses for all the variables in the analysis (Gender:  $\chi^2 = 6.06$ ,  $p = 0.014$ ; Median age: Mann–Whitney  $U = 74.26$ ,  $p < 0.001$ ; Age range:  $\chi^2 = 29.03$ ,  $p < 0.001$ ; Working geographical area:  $\chi^2 = 66.09$ ,  $p < 0.001$ ; Civil status:  $\chi^2 = 13.45$ ,  $p = 0.009$ ; Children:  $\chi^2 = 5.25$ ,  $p < 0.022$ ; Working area:  $\chi^2 = 70.06$ ,  $p < 0.001$ ; Professional tenure: Mann–Whitney  $U = 78.68$ ,  $p = 0.001$ ). Table 2 shows significant differences between nurses who cared and those who did not care for



patients who died of COVID-2019 for age (Median age: Mann–Whitney  $U = 68.04$ ,  $p < 0.001$ ; Age range:  $\chi^2 = 22.42$ ,  $p < 0.001$ ), working geographical area ( $\chi^2 = 173.20$ ,  $p < 0.001$ ), working area ( $\chi^2 = 46.40$ ,  $p < 0.001$ ), and professional tenure (Mann–Whitney  $U = 70.65$ ,  $p < 0.001$ ).

## Worries, Preparedness, and Perceived Impact of the COVID-19 Pandemic

Regarding worries about the pandemic, 73.3% ( $n = 630$ ) of nurses was afraid of getting sick with COVID-19, and 73.7% ( $n = 634$ ) was concerned about putting their family at risk of getting infected. Regarding nurses' preparedness, 79.9% ( $n = 687$ ) of respondents did not feel prepared for the pandemic. In fact, a small percentage (18.3%,  $n = 157$ ) of the sample declared to have received adequate training regarding COVID-19, and 34.3% ( $n = 295$ ) referred to have received adequate training and support on personal protective equipment (PPE). Ninety-three percent ( $n = 799$ ) of nurses referred that their organization was not prepared for COVID-19 pandemic, and 91.0% ( $n = 783$ ) felt that the RHS was not prepared for the pandemic. Seven hundred seventy-nine (90.6%) participants declared that RHS did not inform them about the pandemic management plan.

With regard to the perceived impact of the pandemic on job duties, 46.2% ( $n = 397$ ) of nurses referred increased job demands, and 39.2% ( $n = 337$ ) declared to have carried out tasks outside of their daily duties. Regarding the perceived impact on personal life, 25.0% ( $n = 215$ ) of the participants referred to have been avoided by other people because of their job; 12.2% ( $n = 105$ ) declared that their families were avoided as well because of their job; 8.8% ( $n = 76$ ) referred to avoid telling people about the nature of their job. With regard to non-work-related worries, 63.5% ( $n = 546$ ) of nurses felt that their job would cause their loved ones to run a high risk of COVID-19 infection; 72% ( $n = 619$ ) of nurses reported that their own health was a cause of worry for their loved ones, and 56.0% ( $n = 482$ ) reported that their loved ones were worried to be infected by them. Moreover, results highlight that nurses were fairly concerned for their close friends (29.3%,  $n = 252$ ), for their colleagues (38.1%,  $n = 328$ ), and for their patients (28.5%,  $n = 245$ ). They were very concerned for their partner (25.6%,  $n = 220$ ) and extremely concerned for their children (21.4%,  $n = 184$ ), parents (35.3%,  $n = 304$ ), and old relatives (31.2%,  $n = 268$ ). Regarding health results, 66.0% ( $n = 568$ ) of the participants felt more stressed because of the pandemic, 44.0% ( $n = 378$ ) declared to have a high level of rumination about the pandemic, 19.9% ( $n = 171$ ) referred to have cried at work, and 34.5% ( $n = 296$ ) reported to have watched colleagues crying at work. Furthermore, we compared the study variables discriminating by age, family status, region, and working context. Regarding differences between age ranges, the results showed that young nurses perceived higher non-work-related concerns about infecting family members (79.5%) than elderly nurses (67.8%) ( $\chi^2 = 15.07$ ,  $p < 0.001$ ). Moreover, younger nurses were more worried for both their colleagues' health (79.1%) and their patients' health (84.0%) ( $\chi^2 = 9.70$ ,  $p < 0.01$ ) than older nurses (69.7 and 77.3%, respectively) ( $\chi^2 = 5.76$ ,  $p < 0.05$ ). Regarding differences in terms of family status, single

and divorced nurses are more worried for their friends (73.4 and 61.8%, respectively) ( $\chi^2 = 22.86$ ,  $p < 0.001$ ) and colleagues (80.5 and 75.8%, respectively) ( $\chi^2 = 14.99$ ,  $p < 0.01$ ) than nurses with a different family status (conjugate, widower, and other). Regarding work context, frontline nurses registered higher levels of perceived ostracism (16%) than non-frontline nurses (10.6%) ( $\chi^2 = 5.39$ ,  $p < 0.05$ ), and higher non-work-related worries (78.0 and 70.4%, respectively) ( $\chi^2 = 6.32$ ,  $p < 0.05$ ). No significant differences were found between nurses working in different geographical areas (North-Center and South-Islands) for the study variables.

## Relationships Between Worries, Preparedness, and Perceived Impact of the Pandemic on Health Results

Table 3 presents the results of multivariate analyses. Three binary logistic regression models were performed: the demographic variables included gender, age, frontline/non-frontline nurse, and caring/non-caring for patients who died of COVID-19. The first model included perceived job stress as a dependent variable. The results showed that increased job stress was significantly related to a higher level of rumination (OR = 4.04, 95% CI = 2.77–5.89, and  $p < 0.001$ ), increased job demand (OR = 2.00, 95% CI = 1.38–2.90, and  $p < 0.001$ ), impact on one's job role (OR = 2.56, 95% CI = 1.74–3.77, and  $p < 0.001$ ), watching coworkers crying at work (OR = 1.50, 95% CI = 1.01–2.22, and  $p < 0.05$ ), non-work-related concerns (OR = 2.28, 95% CI = 1.54–3.38,  $p < 0.001$ ), and worry about getting infected (OR = 2.05, 95% CI = 1.39–3.01, and  $p < 0.001$ ). Among control variables, gender was significantly associated with job stress (OR = 1.71, 95% CI = 1.14–2.56, and  $p < 0.05$ ). Specifically, women are more vulnerable to higher levels of stress. Age, caring for patients who died of COVID-19, and being a frontline nurse did not affect perceived job stress. The second regression model included crying at work as a health outcome for nurses. The results showed that increased job stress (OR = 2.52, 95% CI = 1.39–4.56, and  $p < 0.01$ ), rumination on pandemic (OR = 2.28, 95% CI = 1.48–3.51, and  $p < 0.001$ ), and watching colleagues crying at work (OR = 7.92, 95% CI = 5.16–12.16, and  $p < 0.001$ ) were the predictors significantly associated with crying at work. Among the demographic variables, gender was significantly associated with crying at work (OR = 4.61, 95% CI = 2.40–8.86, and  $p < 0.001$ ): females were used as a referral for the regression analysis as well, and the results show that women cry more than men. The third model included rumination on the pandemic as a dependent variable. The results showed that higher levels of rumination were associated with caring for patients who died of COVID-19 (OR = 1.54, 95% CI = 1.07–2.21, and  $p < 0.05$ ), increased job demand (OR = 1.70, 95% CI = 1.25–2.33, and  $p < 0.01$ ), watching colleagues crying at work (OR = 1.81, 95% CI = 1.32–2.48, and  $p < 0.001$ ), non-work-related worries (OR = 1.57, 95% CI = 1.08–2.30, and  $p < 0.05$ ), and worries about getting infected (OR = 2.02, 95% CI = 1.39–2.93, and  $p < 0.001$ ). Gender and age were both significant (OR = 1.45, 95% CI = 1.01–2.07, and  $p < 0.05$ ; OR = 1.32, 95% CI = 1.16–1.50, and  $p < 0.001$ , respectively). Regarding gender, women are more inclined

**TABLE 3** | Binary logistic regression results: relationship between worries, preparedness, and impact of the pandemic on nurses' health outcomes.

Variables in the equation	Perceived job stress			Crying at work			Rumination about pandemic		
	OR	95% CI for OR		OR	95% CI for OR		OR	95% CI for OR	
		Lower	Upper		Lower	Upper		Lower	Upper
Frontline/non-frontline	0.858	0.573	1.284	1.138	0.713	1.816	1.063	0.751	1.504
Gender	<b>1.708</b>	<b>1.145</b>	<b>2.547</b>	<b>4.608</b>	<b>2.396</b>	<b>8.863</b>	<b>1.447</b>	<b>1.009</b>	<b>2.075</b>
Age	1.082	0.931	1.256	1.131	0.945	1.354	<b>1.320</b>	<b>1.158</b>	<b>1.505</b>
Dead patients (yes/no)	0.859	0.555	1.331	1.032	0.637	1.673	<b>1.540</b>	<b>1.071</b>	<b>2.214</b>
Perceived job stress	–	–	–	<b>2.516</b>	<b>1.387</b>	<b>4.564</b>	–	–	–
Rumination	<b>4.041</b>	<b>2.772</b>	<b>5.890</b>	<b>2.279</b>	<b>1.479</b>	<b>3.511</b>	–	–	–
Increased job demand	<b>2.002</b>	<b>1.382</b>	<b>2.901</b>	1.526	0.987	2.360	<b>1.705</b>	<b>1.246</b>	<b>2.334</b>
Impact on job role	<b>2.559</b>	<b>1.737</b>	<b>3.769</b>	1.152	0.751	1.767	1.048	0.762	1.442
Watching colleagues crying at work	<b>1.501</b>	<b>1.014</b>	<b>2.222</b>	<b>7.924</b>	<b>5.165</b>	<b>12.157</b>	<b>1.808</b>	<b>1.320</b>	<b>2.478</b>
Impact on personal life (social ostracism)	1.322	0.744	2.349	1.141	0.667	1.954	1.543	0.995	2.393
Non-work-related worries	<b>2.281</b>	<b>1.540</b>	<b>3.379</b>	1.335	0.743	2.401	<b>1.575</b>	<b>1.081</b>	<b>2.296</b>
Worry about getting infected	<b>2.049</b>	<b>1.392</b>	<b>3.015</b>	1.513	0.849	2.698	<b>2.022</b>	<b>1.394</b>	<b>2.932</b>
Personal preparedness	0.918	0.584	1.443	0.941	0.536	1.652	0.792	0.531	1.183
Adequate support and Info about PPE	0.844	0.576	1.237	1.060	0.668	1.682	0.981	0.703	1.369
RHS preparedness	0.751	0.394	1.431	1.936	0.879	4.264	1.002	0.556	1.803
Organization preparedness	0.861	0.404	1.836	0.488	0.196	1.216	1.900	0.994	3.630

OR, Odd ratio; CI, confidence interval, Values in bold denote significance.

to rumination than men. Regarding age, older nurses are more ruminative than younger ones.

## DISCUSSION

Investigating HCWs' perceived impact and worries on the COVID-19 pandemic is crucial to safeguard professionals' mental health.

The results showed that younger nurses reported higher worries about infecting their family members than older nurses, as well as higher worries about their colleagues and patients' health. Therefore, as a result of this emotional state, younger nurses might be at greater risk for developing stress (13), thus suggesting healthcare organization should pay attention to safeguarding young nurses during this pandemic. Moreover, frontline nurses perceived higher levels of perceived ostracism than non-frontline nurses due to their close contact with patients affected by the virus and high worries about infecting their families and loved ones. Stigmatization and ostracism are aspects that also emerged in recent studies (11, 32) and previous outbreaks (27). These factors emerged to be negatively related to nurses' mental health and stress (33).

With regard to the perceived impact of the COVID-19 pandemic on job duties, 46% of nurses reported increased job demands during the emergency. This aligns with literature that emphasized augmented workload during pandemics (34). Regarding the perceived impact on personal life, about 46% of nurses reported that people avoided them or their families because of their job. This is quite consistent with a previous study developed during the SARS virus in which health care providers experienced discrimination during the epidemic (28). As to non-work-related worries, 64% of nurses were concerned

about putting their loved ones' life at risk. Analogously with previous studies (35), they were mostly worried about their partner, children, parents, and old relatives. Thus, ensuring quarantine to professionals who work with COVID-19 patients would be important to strengthen safety-feeling among nurses. Previous studies showed that the main emotional response to the epidemic/pandemic is increased job stress (36, 37). Our findings support those results by revealing that 66% of nurses perceived high level of stress. In addition, 44.0% of the Italian nurse sample declared to have had higher levels of ruminative thinking about the pandemic. Although there is no study on rumination in HCWs during outbreaks/pandemics, literature shows that rumination is associated with greater burnout, depression, and risk of psychiatric morbidity (38). Rumination is a frequent automatic and passive cognitive activity: people with ruminative thinking tend to remain fixated on the problems without taking action (39). As a result, this dysfunctional response style may compromise emotional processes and negatively influence nurses' mental health (40), as well as hindering an individual's goal achievement (41). About 20% of nurses stated to have cried at work, and 34% declared to have watched their colleagues crying. Crying is a signal that typically communicates emotional distress and is an important symptom that indicates the difficulty to manage work-related emotional pressures (42). For this reason, crying should be considered as a sign of nurses' mental health.

The analysis of the relationship between variables on the three health outcomes (job stress, crying at work, and rumination) showed that worries about getting infected, increased job demand, impact on job role, non-work-related worries, watching colleagues crying, and ruminative thinking were significantly associated with perceived job stress. Moreover, rumination,

job stress, and watching colleagues crying were the risk factors associated with crying at work among nurses. Finally, job demands, non-work-related worries, worries about getting infected, and watching colleagues crying were the main factors associated with rumination about the pandemic. Overall, these results are in line with previous research showing that HCWs experienced increased stress through infectious epidemics (34, 43). According to these studies, we found that worries about falling ill with COVID-19 and putting nurses' loved ones at risk were the main sources of stress. Although, in line with previous research (34, 43), this study showed that the impact of the pandemic on personal life (social ostracism), personal preparedness, RHS and workplace preparedness, and adequate support and information about PPE are important safety aspects for nurses which are not significantly associated with health outcomes. They could likely have an indirect effect on health outcomes, but worries are the main factor that may affect nurses' perceived effectiveness in the pandemic. As a result, pandemics increases nurses' workload due to the increased number of patients to care for, prolonged working hours, and working on tasks that they normally do not perform (27, 44), thus increasing perceived job stress. In addition, the important demands that nurses have to face during the pandemic usually add further emotional requests. Continuous exposure to patients' death and suffering can lead to vicarious trauma and secondary traumatic stress (12, 45). Furthermore, our study shows that crying at work is associated with higher levels of job stress and rumination about the pandemic. This can be due to excessive demands and emotional pressures (42, 46) perceived by nurses during the pandemic. Very interesting is also the role of emotional contagion in watching colleagues crying at work, which would result in a worsening of the symptoms probably due to the shared psychological environment. Finally, increased job stress is associated with rumination about the COVID-19 pandemic, whose main factors are job demands, working and non-work-related concerns, and watching colleagues crying at work. Previous research suggests that person-directed interventions such as cognitive behavioral therapy and relaxation exercises would effectively decrease ruminative thinking (38, 47) and protect nurses' wellbeing. Among covariates, our findings show no difference between frontline or non-frontline nurses in terms of health results. Therefore, although previous studies on epidemics (SARS) paid attention especially to frontline HCWs as professionals at risk of developing traumatic stress (36, 48), in this study we found that being a frontline nurse is not a significant health risk factor. This suggests that the mental health of all professionals from any clinical-care context is at risk during the pandemic. In fact, a recent study on COVID-19 pandemic emphasized that non-frontline workers were more exposed to the risk of vicarious traumatization (12), probably because of inadequately trained to manage emergencies like epidemics/pandemics. On the contrary, gender was the only demographic variable we found to be significantly associated with all three health outcomes. This is likely due to the fact that the nursing profession is mainly female and 78% of our sample included women. Moreover, gender was highly associated with crying at work due probably to the fact that women usually cry more than men (49).

Lastly, age and caring/non-caring for patients who died of COVID-19 were both significantly associated only with rumination. Regarding age range, our results showed no significant difference in rumination, although it would seem that ruminative thinking increases as age progresses. However, given the contrasting results on the matter presented in literature, it remains unclear how age affects rumination (50). Regarding caring/non-caring for patients who died of COVID-19, the results show that nurses with experience of dead patients had higher levels of rumination. Therefore, nurses may perceive the death of patients whom they cared for during the pandemic as a strong emotional experience that adds excessive pressure, thus leading to rumination.

## Limitation and Future Research

This study presents a few limitations that may be addressed in further research. Firstly, the online system used to collect data may have determined a sampling bias due to the random selection of participants. In this sense, our sample might not be representative of the nursing population and generalizability should be done with caution. A stratified survey would reduce sampling errors and enhance the external validity of studies (51). Secondly, this study lacks longitudinal study design. We carried out a cross-sectional study that does not allow for causal connections between variables (52). While our results are overall consistent with previous studies on epidemics/pandemics, future studies should test long-term effects of the COVID-19 pandemic on nurses' health outcomes. Thirdly, we used a self-administrated questionnaire that has limitations in terms of rating bias. Nevertheless, the health outcomes analyzed in this study (job stress, crying, and rumination) are based on the perception of a discomfort at work during a pandemic. In this sense, self-report questionnaires are adequate instruments to collect perception data. Finally, we chose measure some variables with one item. We are aware that multi-item psychometric scales are more reliable in assuring content validity. Nevertheless, single-item scales can be a good compromise between practical needs and psychometric concerns (53), especially when emergency situations like the pandemics demand to reduce the time needed to complete the survey. Fourthly, we measured some variables by using single items in order to complete the survey in <10 min. This choice was due to the period of high emergency in which the study was conducted (in the middle of the first COVID-19 wave in Italy), such that it was necessary to collect data promptly without cognitively overloading the workers. Although the choice to use single items is questioned as multiple-item scales tend to be more reliable and ensure content validity, it is generally agreed that single-item measures provide an acceptable balance between practical needs and psychometric concerns. They are usually used in occupational health studies and are considered to be reliable (54). Finally, the main measures used in our study were adapted from a previous instrument developed during SARS outbreak. Our study was carried out during the early phase of the pandemic and there was not sufficient time to develop and validate new scales. In this sense, we decided to use a reliable measure from previous studies. However, new scales were developed in the last months and future research could examine the validity of these measures.

## Practical Implications for Nurses' Health

Despite the limitations, this study can have important implications for nurses. Nurses' work-related and non-work-related worries about the pandemic could affect their overall effectiveness at work. Therefore, these concerns should be addressed by devising effective preventive strategies to avoid prolonged consequences in terms of mental health. Among the interventions to reduce nurses' worries, providing a place where they can temporarily isolate themselves from their family (55) may be an effective strategy. In addition, as stress theory revealed (56, 57), workload represents a crucial stressor for professionals. It should thus be reduced by increasing human resources and providing organizational support to limit the negative impact in terms of stress and rumination. Moreover, as crying at work is associated with both higher levels of job stress and rumination, due probably to excessive demands and emotional pressures during the pandemic, health organizations should implement actions to reduce stress and foster psychological support especially for nurses with inadequate training in emotion regulation labor. Finally, as rumination is associated with a number of stress-related disorders, it would be important to reduce ruminative thinking about the pandemic through coping strategies which help nurses to recover during leisure time and reduce job stress (58).

## CONCLUSIONS

The psychological impact that the COVID-19 pandemic may cause in the medium/long term could be greater than the economic one. This is the main challenge that health organizations will have to face in the future: in fact, we are currently experiencing the third wave of this outbreak. In this phase, it is crucial that decision-makers develop awareness of the impact of this pandemic on nurses' mental health and promptly implement regional and national interventions to lessen the risk of developing depressive symptoms and post-traumatic stress disorders.

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## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors upon reasonable request.

## ETHICS STATEMENT

The study complies with the Declaration of Helsinki and with the General Data Protection Regulation (EU) 2016/679 (GDPR). Participation was voluntary and anonymous, according to Italian Data protection law (e.g., Decree n. 196/2003). Participants could interrupt their participation in the survey at any time without any adverse consequence. We consulted the Institutional Review Boards of the University of Cagliari, which informally said that Ethical review and approval was not required for the study on human participants, in accordance with the local legislation and institutional requirements.

## AUTHOR CONTRIBUTIONS

MG, IPi, and IPo conceived and designed the study, collected, analyzed and interpreted the data, and drafted the manuscript. FM analyzed the data, edited, and revised the manuscript. GE, ED'A, PC, and MC edited and revised the manuscript critically. All authors approved the final version of the manuscript.

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# Fear in the Chinese Population: Influential Patterns in the Early Stage of the COVID-19 Pandemic

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Major global public health emergencies challenge public mental health. Negative emotions, and especially fear, may endanger social stability. To better cope with epidemics and pandemics, early emotional guidance should be provided based on an understanding of the status of public emotions in the given circumstances. From January 27 to February 11, 2020 (during which the cases of COVID-19 were increasing), a national online survey of the Chinese public was conducted. A total of 132,482 respondents completed a bespoke questionnaire, the Emotion Regulation Questionnaire, and the Berkeley Expressivity Questionnaire (BEQ). Results showed that at the early stage of the COVID-19 epidemic, 53.0% of the Chinese population reported varying degrees of fear, mostly mild. As seen from regression analysis, for individuals who were unmarried and with a relatively higher educational level, living in city or area with fewer confirmed cases, cognitive reappraisal, positive expressivity and negative inhibition were the protective factors of fear. For participants being of older age, female, a patient or medical staff member, risk perception, negative expressivity, positive impulse strength and negative impulse strength were the risk factors for fear. The levels of fear and avoidant behavior tendencies were risk factors for disturbed physical function. Structural equation modeling suggested that fear emotion had a mediation between risk perception and escape behavior and physical function disturbance. The findings help to reveal the public emotional status at the early stage of the pandemic based on a large Chinese sample, allowing targeting of the groups that most need emotional guidance under crisis. Findings also provide evidence of the need for psychological assistance in future major public health emergencies.

**Keywords:** COVID-19, Chinese population, fear, pandemic, mental health

## INTRODUCTION

Major public health emergencies have a profoundly negative influence on public health, which not only seriously threatens the life safety of the public, but also brings huge psychological impact to the population. The COVID-19 pandemic occurred at the beginning of 2020. The World Health Organization announced that COVID-19 is a “worldwide public health emergency” on the 30th of

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January 2020. By the end of May 2020, there were more than 5 million confirmed cases worldwide, with about 347 thousand losing their lives because of infection. As a result, the global social stability has been significantly endangered.

Fear is an instinctive emotional response in human beings when facing life-threatening events. During an epidemic, fear is potentially adaptive or protective for the individual (McEwen, 2007). However, over-generated fear might endanger physical function and produce negative behavioral reactions, which will have adverse effects on people's mental health, quality of life and social stability (Su and Wei, 2005). During the Ebola outbreak in West Africa from 2013 to 2016, behaviors caused by fear were significant throughout the outbreak, leading to an increase in virus transmission, interference with effective treatment, and indirect mortality from non-Ebola diseases (Shultz et al., 2016). During the Ebola epidemic in 2016, a survey in Guangzhou of China, a city with a large number of African immigrants, showed that 31% of students reported negative emotions, such as panic, fear, and worry (Lau et al., 2016). During the SARS epidemic in 2003, as people became more aware of the seriousness of SARS, there was widespread panic and fear of going out (Wang and Luo, 2003). In the Taiwan region, fear seriously affected people's daily lives, and there was evidence that the underground passenger flow reduced by 1,200 people for each new case (Wang, 2014). The spread of fear may lead to disturbances in physical health, e.g., during the SARS period, a student showed fever symptoms, and then 15 classmates in the same class consequently developed into fever symptoms, which was diagnosed as a mass hysteria caused by the "SARS" panic after investigation (Pu et al., 2003). These results highlighted the importance of fear during epidemics. However, there is a lack of investigations using large samples into the early public fear response during health outbreaks. Such research would be of great value in informing the development of targeted psychological interventions and providing effective psychological guidance.

Under crisis, many factors might influence the emotion of personal fear. Risk perception refers to people's feelings and understanding about the potential risks affecting daily life, and is also an index of public panic (Sitkin and Pablo, 1992; Sitkin and Weingart, 1995). Individuals with higher risk perceptions are more likely to develop irrational tension or panic (Shi et al., 2003). For example, during the H1N1 pandemic outbreak in 2009, people who considered the severity and susceptibility of the pandemic to be higher and who concerned whether the government was well prepared were more likely to be depressed than others (Lau et al., 2010). Relatively, reasonable perception of the risks guaranteed adequate health-seeking behavior (Lau et al., 2005). However, excessive risk perception may lead to escape behaviors (Jiang et al., 2009). These results confirmed the effect of risk perception on personal emotion. However, during the current COVID-19 outbreak, it is not clear whether risk perception is a risk predictor of fear, which is important for the provision of early emotional guidance.

Emotional regulation strategies refer to the processes through which individuals exert influence on the occurrence, expression, and perception of emotions. This important coping style affects the outcome of negative events. Cognitive reappraisal and

expressive suppression are two emotional regulation mechanisms that directly influence individual emotions (Ciuluvica et al., 2019). Cognitive reappraisal occurs early in the emotion-generative process and expressive suppression occurs late in the emotion-generative process (John and Gross, 2007; Cheng et al., 2009). Researchers (Gross and John, 2003) pointed out that cognitive reappraisal allows an individual to re-explain an event and change its effect on emotions. It had been reported that cognitive reappraisal could reduce negative emotions effectively (Kobayashi et al., 2020), while the effect of expressive suppression was weaker. Gross also pointed out that emotional expressivity is a kind of regulation strategy opposite to expressivity suppression, which has a unique influence on emotions, related to negative emotion and mental health problems (Gross and John, 1995). But, it had also been pointed out that the effect of expression suppression on individual emotion regulation was different in different cultural backgrounds (Liu et al., 2016). For example, in the western culture, expressivity suppression usually played a negative role (Boekaerts and Monique, 2013); while in the eastern culture, expressivity suppression may played a positive role (Dou et al., 2013). A study of Chinese college students confirmed that, expressive suppression was as effective as cognitive reappraisal in down-regulating the intensity of experienced negative emotion, and expressive suppression dampens negative emotion more quickly than cognitive reappraisal in Chinese individuals (Yuan et al., 2015). However, previous researchers have usually observed the effect of emotion regulation strategies on emotion broadly, while the protective or risk effects of different types of emotional regulation strategies on different types of emotion, and especially fear during a crisis, have not been systematically revealed.

When fear emotions persist, behavior patterns change. Studies have shown that fear emotion was related to increased avoidant behaviors (Barr et al., 2008; Smith et al., 2009). For example, during the SARS epidemic, some Taiwan nurses (especially married nurses), applied for resignation, and exhibited higher risk perceptions and stronger fear (Chong et al., 2004). Furthermore, people who were depressed during the H1N1 pandemic were more likely to take avoidant action (Lau et al., 2010). These results suggest that negative emotions might increase the avoidant behaviors.

The experience of intense or long-term stress can disrupt personal physical functions, such as loss of appetite, indigestion difficulties, and sleep problems (Chen, 2004). It has been reported that psychological responses, in particular, negative emotions including fear and depression are correlated with sleep disturbance (Zhang et al., 2003). Moreover, people's diet behavior is influenced by emotional arousal, including fear and anger (Canetti et al., 2002). Among which, fear may lead to diet disturbance in young adult and adolescents (Anderson et al., 2018), as well as resulting in greater sleep disturbance (Fidel et al., 2018). These results suggest that negative psychological responses, especially fear, closely correlate with physical disturbance.

Previously, Myer raised a triage assessment system (TAS) for crisis circumstances. The TAS assesses personal affective, behavioral, and cognitive reactions toward crisis events (Myer and Conte, 2006). However, the TAS does not include the



evaluation of physical function, which is also an important index of the acute stress response (Milligen et al., 2020). In Tong's stress response model, panic is the most important factor in the acute stress response, followed by a defense response, and cognition of the outbreak (Tong, 2004). However, what is the relationship between fear and risk factors, avoidant behaviors, and physical disturbance? Does fear bridge a role between them? What kind of risk factors predict fear? Does fear predict avoidant behaviors and physical disturbance? The answers to these questions remain largely unknown but are crucial for the development of psychological support programs for future crises.

In the face of negative events, personal psychological responses interact with each other, and this might also be influenced by demographic variables such as gender. Many studies have shown a significant correlation between gender and fear (Egbor and Akpata, 2014; Kazancioglu et al., 2015), for example, a study showed that women are more dental surgical fear than men (Mohammed et al., 2014). It has also been reported that fear is more common in young patients (Appukkuttan et al., 2015), and has a significant inverse relationship with the age of individuals (Egbor and Akpata, 2014). However, these results have been inconsistent, with evidence of higher levels of fear in older patients (Beatriz et al., 2015). In terms of marital status, there are significant differences in the scores for fear among married, unmarried, divorced, and widowed patients (Egbor and Akpata, 2014). In China, the study of fear in the recurrence of gynecologic tumors has shown that many factors, such as age, marital status, and educational level, have direct and indirect effects on fear (Qi et al., 2016; Meng et al., 2019). These results confirm the potential prediction of demographic factors relating to fear during epidemics. However, which factors are protective and which are risky remains unclear.

In sum, this study aimed to observe the status of fear in the Chinese population during the increasing stages of the COVID-19 pandemic. The trend over time, predictors from demographic variables (gender, age, degree of education, marital status, person type, and confirmed cases in city or area) and psychological variables (risk perception and emotional regulation), and the relationship with avoidant behavior tendencies and disturbed physical function, were explored through a national online investigation. Our hypotheses were: (1) Chinese people may experience fear at an early stage in the COVID-19 pandemic, and the level of fear might gradually decrease along with time; (2) demographic factors, such as gender, age, degree of education, marital status, person type, confirmed cases in city or area, might be related to the level of fear, among them, being female, older age and higher education level may increase the fear emotion, and being unmarried and having fewer confirmed cases may decrease the fear emotion; (3) risk perception and negative expressivity might increase fear emotion, while cognitive reappraisal, expressive suppression, positive expressivity, and negative inhibition might decrease fear emotion; (4) fear might increase avoidant behaviors and disturbed physical function; and (5) fear might have a bridging role between risk perception, avoidant behavior tendencies, and physical disturbance.

## MATERIALS AND METHODS

### Participants

Individuals in the Chinese population aged between 18 and 75 years old, who could read and write Chinese, and were able to access a computer or smartphone with internet, were eligible for this online national investigation conducted between January 27 and February 11, 2020. Questionnaire with incomplete and invalid answers were excluded from the formal analysis. From the 135,458 collected questionnaires, 132,482 questionnaires were effective. This included 129,190 participants (97.52%) from the general population, 3,025 participants (2.28%) classified as medical staff member, 95 (0.07%) confirmed patients, 93 (0.07%) suspected patients, 36 (0.03%) recovered patients, and 43 (0.03%) family members of patients. There were more women (55.1%) than men (44.9%) and 74.8% were aged 20-49 years old. The lower education level (middle school or lower) was 56.5, and 52.8% of the population were married, and 54.5% had experienced outbreaks such as SARS. According to the confirmed cases in the city or area, respondents from cities with >10,000 cases accounted for 3.1% of the overall sample.

### Instruments

Based on previous literature and mature questionnaire at home and abroad (Chen et al., 2003; Shi et al., 2003; Wang and Luo, 2003), a self-designed questionnaire was developed by the authors, which comprised of demographic variables, fear emotion, cognitive sources of fear, risk perception section, avoidant behavior tendency section, and disturbed physical function section.

### Demographic Variables

General information: Basic demographic characteristics, including gender, age, degree of education (middle school or lower, high school, college, and postgraduate degree or higher), marital status (married, unmarried, divorced, and widowed), person type (general population, confirmed patients, suspected patients, recovered patients, family members of patients, and medical staff member), confirmed cases in city or area (>10,000 cases, 1,000–10,000 cases, 500–1,000 cases, 100–500 cases, and <100 cases) and whether the respondent had previously experienced an outbreak such as SARS, were collected.

### Psychological Factors

Fear emotion: one question with five options (none, mild, moderate, severe, extremely and severe/unbearable) was presented: "How much fear do you feel today?"

Cognitive sources of public fear: to explore possible cognitive sources of public fear, 14 questions were presented (with yes or no response options) relating to fear: being infected by the virus, the possibility of people being infected without isolation, new confirmed cases, death after infection, shortage of protective supplies, the possibility of people being infected without protection, death number, disrupted work or study after the pandemic, new foci, new suspected cases, insufficient cooperation of patients, being isolated due to the pandemic,

insufficient duty by medical staff members, and others. The C. Hoyt's reliability  $r$  was 0.251 in this study.

**Risk perception:** to measure people's risk perception during the pandemic, three questions were presented (with yes or no response options): "This is a severe outbreak," "The pandemic is close to me," "I am in danger." Exploratory factor analysis [EFA, principal axis factoring (PAF)] and reliability analysis showed that the KMO of the scale was 0.622, accounting for 57.94% of the total variance and Cronbach's alpha was 0.635.

**Avoidant behavior tendencies:** To measure potential avoidant behavior tendencies during the pandemic, three questions were presented (with yes or no response options): "I am intending to run away if possible," "To escape isolation, I might not go to hospital if I am a suspected case," "To protect myself and families, I might quit the job if I am medical staff member." The KMO of this scale was 0.687, accounting for 77.88% of the total variance, and Cronbach's alpha was 0.857.

**Disturbed physical function:** to observe potential disturbed physical health under pandemic, three questions were presented (with yes or no response options): "Within the past week, I cannot keep regular schedule as usual," "Within the past week, I cannot eat well as usual," "Within the past week, I cannot sleep well as usual." The KMO of this scale was 0.602, accounting for 56.20% of the total variance, and Cronbach's alpha was 0.607.

**Emotional regulation strategies:** the Emotion Regulation Questionnaire consisting of (ERQ) 10 items was used (Gross and John, 2003) as translated into Chinese (Wang et al., 2007). High scores indicate higher cognitive reappraisal and expressive suppression, respectively. Cronbach's alpha coefficient was 0.827 for cognitive reappraisal and 0.714 for expressive suppression in this study.

The Berkeley Expressivity Questionnaire (BEQ; Gross and John, 1995) was used to assess personal emotional expression. The Chinese version of BEQ comprises 16 items and five subscales (Zhao et al., 2015): positive expressivity, negative expressivity, negative inhibition, positive impulse strength, and negative impulse strength. The Cronbach's alpha coefficient was 0.834 in this study.

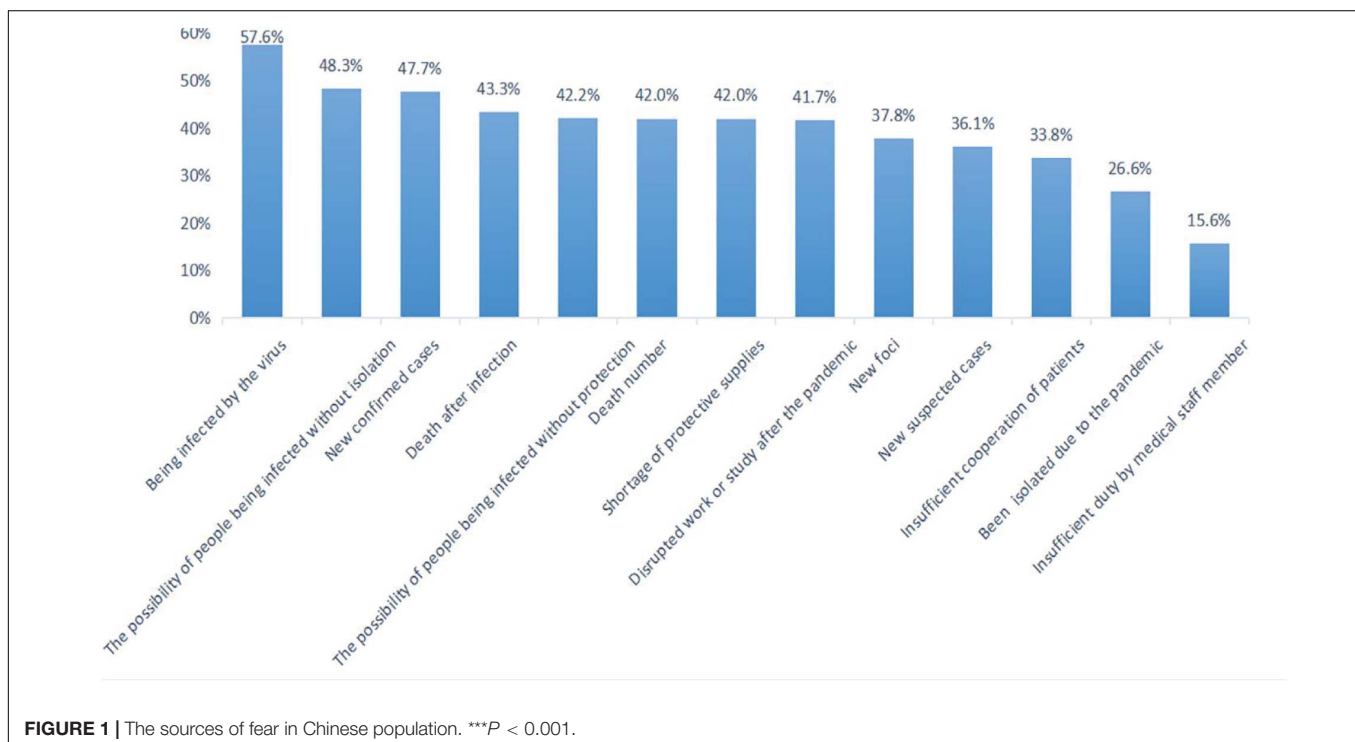
## Procedures

Questions were listed in an online questionnaire, which was screened and approved by the Human Research Ethics Committee of the Army Medical University of China and Wenjuanxing online platform<sup>1</sup> which providing functions equivalent to Amazon Mechanical Turk. After click-signing on an online informed consent form, individuals completed the questionnaire through an online link. The target population was the individuals under the pandemic (except special careers, such as medical workers, police, military, etc.). The questionnaire included variables about demographic information and psychological factors (fear emotion, sources of fear, risk perception, avoidant behavior tendency, disturbed physical function, emotional regulation, and emotional expressivity).

## Statistical Analysis

$T$ -test and one-way ANOVA were conducted to explore the demographic characteristics of fear.  $t$ -test analyze was carried out to analyze the relationship between risk perception, emotional regulation strategies, and fear.  $\chi^2$  test was carried out to observe the effects of fear emotion on avoidant behavior tendencies

<sup>1</sup>www.wjx.top



and disturbed physical function. Stratified linear hierarchical regression analysis was carried out to observe the predictors of fear emotion, in which demographic variables were put as first layer, and psychological factors were second layer. Linear regression analysis was also carried out to observe the prediction of fear emotion on disturbed physical function. Structural equation model was carried out with AMOS 24.0 to test the direct and mediating effect of fear emotion on avoidant behavior

tendencies and disturbed physical function. Evidence of model fit was determined according to standard interpretations of the fit indices, including CFI values of at least .950, and an RMSEA no greater than .080 (Hu and Bentler, 1999). Bootstrap tests (2,000 repeated samples and 95% confidence interval) were used to test the significance of the mediating effect (Baron and Kenny, 1986), with 95% CI did not contain 0 indicating a significant mediating effect.

**TABLE 1** | Comparison of fear in different variables ( $N = 1,32,482$ ).

Variables		$\bar{x} \pm SD$	$t/F$	$P$
Gender	Male	1.68 ± 0.80	-14.590	$P < 0.001$
	Female	1.74 ± 0.82		
Age	<19	1.67 ± 0.80	35.56	$P < 0.001$
	20–29	1.66 ± 0.80		
	30–39	1.73 ± 0.82		
	40–49	1.74 ± 0.82		
	50–59	1.73 ± 0.82		
	>60	1.76 ± 0.82		
Marital status	Married	1.75 ± 0.82	88.39	$P < 0.001$
	Unmarried	1.67 ± 0.79		
	Divorced	1.72 ± 0.86		
	Widowed	1.77 ± 0.97		
Educational level	Middle school or lower	1.74 ± 0.89	78.82	$P < 0.001$
	High school	1.67 ± 0.79		
	College	1.71 ± 0.77		
	Postgraduate degree or higher	1.83 ± 0.80		
Person type	General population	1.71 ± 0.81	60.66	$P < 0.001$
	Confirmed patients	2.42 ± 1.43		
	Suspected patients	2.43 ± 1.22		
	Recovered patients	2.14 ± 1.22		
	Family members of patients	2.28 ± 1.05		
	Medical staff member	1.88 ± 0.75		
Confirmed cases in city or area	>10,000 cases	1.83 ± 0.86	33.88	$P < 0.001$
	1,000–10,000 cases	1.73 ± 0.81		
	500–1,000 cases	1.70 ± 0.80		
	100–500 cases	1.70 ± 0.82		
	<100 cases	1.70 ± 0.81		
Experienced an outbreak such as SARS	Yes	1.73 ± 0.81	9.84	$P < 0.001$
	No	1.69 ± 0.81		

## RESULTS

### Levels of Fear in the Chinese Population

In total, 70,207 (53.0%) of the Chinese population in this study reported different degrees of fear, with a score of  $1.71 \pm 0.81$ . Through frequency analysis, it was found that 62,275 participants (47.0%) reported not experiencing fear, 50,764 participants (38.3%) reported mild fear, 15,255 participants (11.5%) reported moderate fear, 3,404 participants (2.6%) reported severe fear, and 784 participants (0.6%) reported extremely severe fear.

### Cognitive Sources of Fear

Frequency analysis showed that the top three causes of fear were: being infected by the virus, the possibility of people being infected without isolation, and new confirmed cases (see **Figure 1**). In addition, insufficient duty by medical staff member and being isolated due to the pandemic were the bottom two reasons for fear.

### Impact of Demographic Characteristics on Fear

To observe the potential relationship between demographic characteristics and people's fear, independent  $t$ -tests and one-way ANOVAs were carried out. These found that the scores for fear differed by gender, age, degree of education, marital status, person type, city type (categorized by confirmed cases in city or area), and whether having experienced epidemic such as SARS. Higher levels of fear were found in females, people of elder age, individuals with postgraduate or higher degrees, patients and medical staff member, individuals coming from a city or area with most serious levels of pandemic and those who had experienced SARS, while unmarried people reported lowest levels of fear (see **Table 1**).

### Relationship Between Fear With Risk Perception, Avoidant Behavior Tendency, Physical Function, and Emotion Regulation Strategy

#### Impact of Risk Perception and Emotion Regulation Strategy on Fear

As can be seen from **Figure 2**, those who indicated “This is a severe outbreak,” “The pandemic is close to me” and “I am in danger” reported highest levels of fear ( $P < 0.001$ ) (for detailed values see **Supplementary Table 1**).

Through correlation analysis, we found that cognitive reappraisal ( $r = -0.010$ ,  $P < 0.001$ ) and expressive suppression

( $r = -0.018$ ,  $P < 0.001$ ) were negatively correlated with the level of fear. Positive expressivity ( $r = 0.043$ ,  $P < 0.001$ ), negative expressivity ( $r = 0.155$ ,  $P < 0.001$ ), positive impulse strength ( $r = 0.123$ ,  $P < 0.001$ ), and negative impulse strength ( $r = 0.180$ ,  $P < 0.001$ ) were positively correlated with the level of fear; and negative inhibition ( $r = -0.039$ ,  $P < 0.001$ ) were negatively correlated with the level of fear.

### Impact of Fear Emotion on Avoidant Behavior Tendency and Disturbed Physical Function

As the level of fear emotion increases, the proportion of the population “intending to run away if possible” ( $\chi^2 = 6762.34$ ,  $P < 0.001$ ,  $df = 4$ ), planning “not go to hospital if I’m suspected” ( $\chi^2 = 94.23$ ,  $P < 0.001$ ,  $df = 4$ ) and to “quit the job if I’m medical staff member” ( $\chi^2 = 118.54$ ,  $P < 0.001$ ,  $df = 4$ ) increased (see **Figure 3A**).

As expected, as the level fear increased, the disturbed physical function of the population who “cannot keep regular schedule as usual” ( $\chi^2 = 3,112.13$ ,  $P < 0.001$ ,  $df = 4$ ), who “cannot eat well as usual” ( $\chi^2 = 6219.46$ ,  $P < 0.001$ ,  $df = 4$ ) and who “cannot sleep well as usual” ( $\chi^2 = 8725.31$ ,  $P < 0.001$ ,  $df = 4$ ) increased significantly (see **Figure 3B**).

### Regression Analysis of Fear and Disturbed Physical Function

With the level of fear as the dependent variable, a stratified linear regression was conducted with demographic factors (including age, gender, marital status, degree of education, person type, and city type) and psychological factors (including risk perception

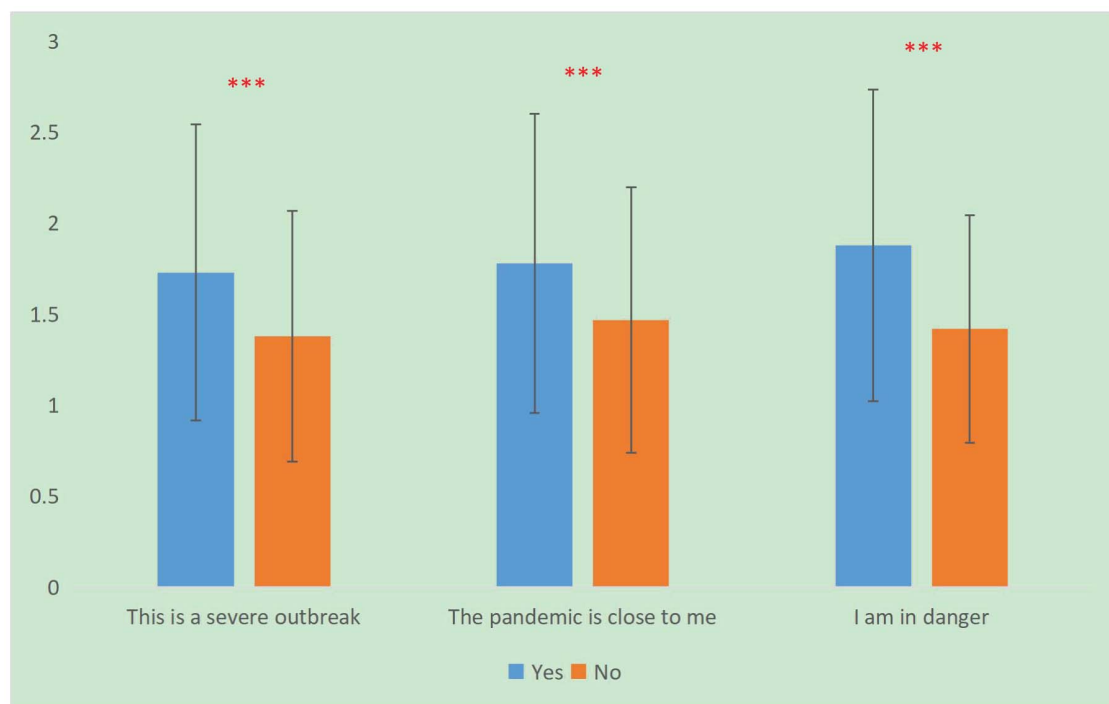
and emotional regulation) as independent variables. The results showed that among the demographic factors, being unmarried, having a relatively higher educational level (high school and college), and living in a city or area with fewer confirmed cases were protective factors of the level of fear. Being older, female, having a postgraduate or higher educational level, being a patient or medical staff member, were risk factors for fear. Among the psychosocial factors, risk perception, negative expressivity, positive impulse strength and negative impulse strength were risk factors for the level of fear, while cognitive reappraisal, positive expressivity and negative inhibition were protective factors (Adjusted  $R^2 = 0.105$ ,  $P < 0.001$ ) (see **Table 2**).

With disturbed physical function as the dependent variable, regression analysis showed that the level of fear and avoidant behavior tendencies were risk factors for disturbed physical function (Adjusted  $R^2 = 0.074$ ,  $P < 0.001$ ) (see **Table 3**).

### Mediation Analysis of Fear Emotion

Confirmatory factor analysis of risk perception, escape behavior tendency, and physical function disturbance were carried out (see **Supplementary Figure 1**), which confirmed that path coefficients for each model were significant ( $P < 0.001$ ).

To further explore the interaction between fear emotion and risk perception, avoidant behavior tendency, and physical function, a hypothesis-driven model test was carried out as **Figure 4**. The model fit showed that each index of the model was good ( $\chi^2/df = 7.65$ , GFI = 1.00, AGFI = 1.00, RMSEA = 0.007), which indicated that risk perception had a positive direct effect on fear emotion and avoidant behavior tendency, and indirect

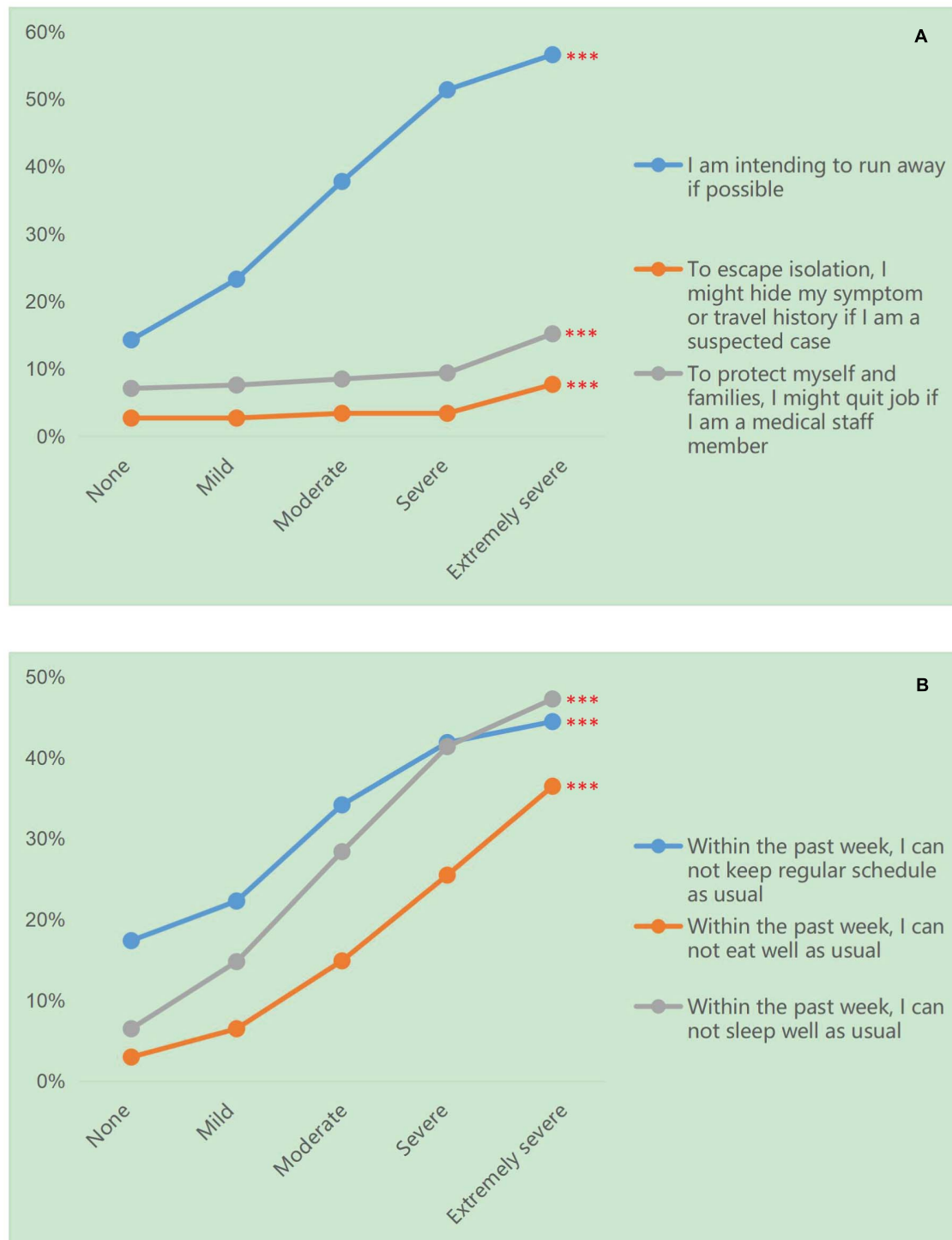


**FIGURE 2** | The effect of risk perception on fear in Chinese population. \*\*\* $P < 0.001$ .



effect on avoidant behavior tendency (0.041, 0.04–0.043) and disturbed physical function (0.073, 0.073–0.075). Fear emotion had positive direct effect on avoidant behavior tendency and disturbed physical function, and indirect effect on disturbed

physical function (0.015, 0.014–0.017). The results indicated a positive effect of risk perception on fear emotion, and a mediation effect of fear emotion between risk perception and avoidant behavior tendency and disturbed physical function.



**FIGURE 3 |** The effect of fear on avoidant behavior tendencies and disturbed physical function in Chinese population. **(A)** The effect of fear on avoidant behavior tendencies in Chinese population. **(B)** The effect of fear on disturbed physical function in Chinese population. \*\*\* $P < 0.001$ .

**TABLE 2 |** Stratified regression modeling results for fear.

Predictors	Model 1		Model 2	
	B (95% CI)	t	B (95% CI)	t
<b>Demographic factors</b>				
Age	0.001 (0.001, 0.002)	4.014***	0.001 (0.000, 0.001)	2.646**
Gender				
Male	Ref		Ref	
Female	0.042 (0.030, 0.055)	6.643***	0.035 (0.023, 0.047)	5.794***
Marital status				
Married	Ref		Ref	
Unmarried	-0.072 (-0.081, -0.063)	-15.601***	-0.028 (-0.037, -0.020)	-6.432***
Divorced	-0.029 (-0.056, -0.003)	-2.143*	-0.014 (-0.039, 0.012)	-1.049
Widowed	0.009 (-0.049, 0.067)	0.306	0.039 (-0.016, 0.094)	1.397
Educational level				
Middle school or lower	Ref		Ref	
High school	-0.067 (-0.079, -0.056)	-11.382***	-0.049 (-0.060, -0.038)	-8.629***
College	-0.039 (-0.050, -0.028)	-7.057***	-0.027 (-0.038, -0.017)	-5.082***
Postgraduate degree or higher	0.073 (0.048, 0.098)	5.767***	0.092 (0.068, 0.116)	7.569***
Person type				
General population	Ref		Ref	
Confirmed patients	0.698 (0.536, 0.861)	8.409***	0.569 (0.415, 0.723)	7.238***
Suspected patients	0.695 (0.531, 0.860)	8.280***	0.519 (0.363, 0.675)	6.535***
Recovered patients	0.422 (0.157, 0.686)	3.127**	0.267 (0.017, 0.517)	2.092*
Family members of patients	0.564 (0.322, 0.806)	4.571***	0.401 (0.172, 0.629)	3.433**
Medical staff member	0.151 (0.121, 0.180)	9.991***	0.047 (0.019, 0.075)	3.289**
Confirmed cases in city or area				
>10,000 cases	Ref		Ref	
1,000–10,000 cases	-0.105 (-0.131, -0.079)	-7.944***	-0.066 (-0.090, -0.041)	-5.284***
500–1,000 cases	-0.132 (-0.157, -0.106)	-10.019***	-0.093 (-0.117, -0.069)	-7.478***
100–500 cases	-0.140 (-0.166, -0.113)	-10.372***	-0.092 (-0.117, -0.067)	-7.244***
<100 cases	-0.152 (-0.184, -0.120)	-9.236***	-0.095 (-0.126, -0.065)	-6.116***
<b>Psychological factors</b>				
Risk perception				
This is a severe outbreak				
No			Ref	
Yes			0.135 (0.115, 0.156)	13.043***
The pandemic is close to me				
No			Ref	
Yes			0.081 (0.070, 0.093)	13.872***
I am in danger				
No			Ref	
Yes			0.392 (0.383, 0.402)	81.580***
Emotion regulation				
Cognitive reappraisal			-0.004 (-0.004, -0.003)	-9.308***
Expressive suppression			-0.001 (-0.002, 0.000)	-1.932
Positive expressivity			-0.013 (-0.015, -0.011)	-15.266***
Negative expressivity			0.010 (0.009, 0.012)	14.718***
Negative inhibition			-0.003 (-0.005, -0.001)	-3.671***
Positive impulse strength			0.005 (0.004, 0.007)	6.032***
Negative impulse strength			0.034 (0.032, 0.035)	39.248***
Adjusted R <sup>2</sup>	0.008		0.113	
F(df <sub>1</sub> , df <sub>2</sub> ), p-value	F(17, 1,32,464) = 65.26, P < 0.001		F(27, 1,32,454) = 626.51, P < 0.001	

\*P &lt; 0.05, \*\*P &lt; 0.01, \*\*\*P &lt; 0.001.

**TABLE 3** | Linear regression modeling results for disturbed physical function.

Predictors	Model 1	
	B (95% CI)	t
Fear emotion		
None	Ref	
Mild	0.155 (0.146, 0.164)	34.145***
Moderate	0.473 (0.459, 0.486)	68.475***
Severe	0.766 (0.740, 0.792)	57.143***
Extremely severe/unbearable	0.942 (0.889, 0.996)	34.561***
Avoidant behavior tendencies	0.130 (0.123, 0.138)	33.523***
Adjusted $R^2$	0.074	
F(df <sub>1</sub> , df <sub>2</sub> ), p-value	F(5, 1,32,476) = 2132.38, $P < 0.001$	

\*\*\* $P < 0.001$ .

## DISCUSSION

This study observed fear in the Chinese population at an early stage of the COVID-19 outbreak and its relationship with risk perception, avoidant behavior tendencies, physical function, and emotional regulation through a large sample ( $N = 1,32,482$ ) online national investigation. The findings showed that the Chinese population experienced some fear, but was not panicking during the pandemic. Being unmarried, having a relatively high educational level, living in a city or area with fewer confirmed cases, cognitive reappraisal, positive expressivity and negative inhibition were protective predictors of the level of fear. Being of older age, female, having a postgraduate or higher educational level, being a patient or medical staff member, risk perception, negative expressivity, and positive/negative impulse strength were risk predictors of the level of fear.

### Level of Fear in the Chinese Population

In this study, 53.0% of the Chinese population reported a degree of fear, indicating that fear was prevalent during the outbreak. Further analysis found that this fear was mainly mild, indicating that the Chinese population was not panicking. This finding helps the Chinese government and international organizations better understand the Chinese population's emotional status under the COVID-19 pandemic.

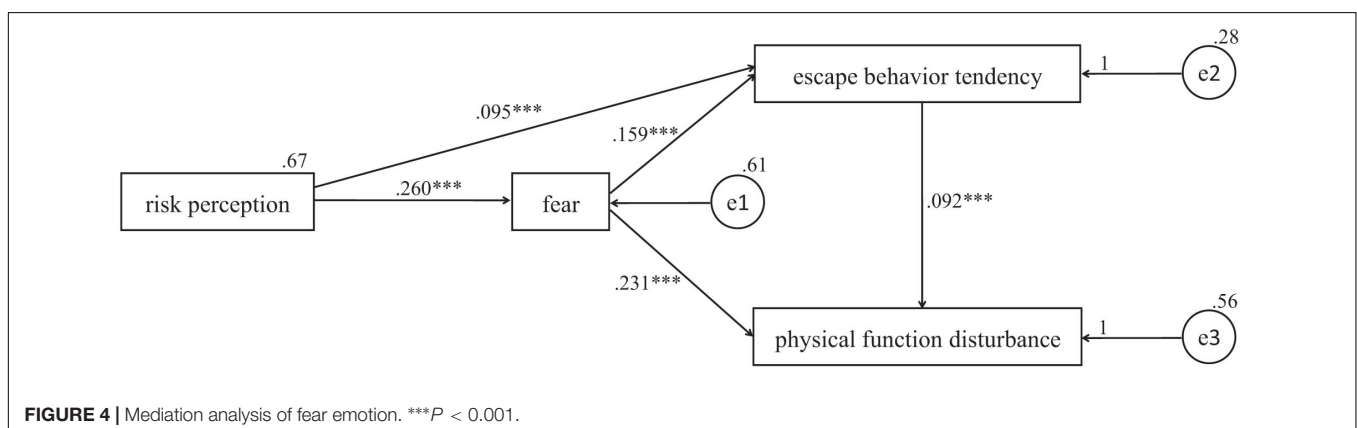
## Cognitive Sources of Fear in the Chinese Population

The top three sources of fear in this study were: being infected by the virus, the possibility of people being infected without isolation, and new confirmed cases. During the SARS epidemic, fear came mainly from the characteristics of SARS (strong infectivity and high risk) and the temporary lack of effective treatment (Chen et al., 2003). It can be seen that the characteristics of the disease itself (infectious and high risk) were the main source of fear in public. Findings confirmed that the main sources of fear came from both the possible influence of the pandemic on the individual, and the macro-development of a national epidemic. These findings provide suggestions to the government about required emotional guidance during the pandemic, i.e., knowledge education and information for the public.

### Influential Factors of Fear

Our study showed that there were stronger levels of fear in females and people of older age. Older participants may have experienced stronger fear due to having poorer health status and being more vulnerable to the virus. This is consistent with the fact that unmarried young people reported the lowest levels of negative emotion due to most likely having better health status in general. Individuals with postgraduate or higher degrees and people who had experienced SARS may have had stronger fear because they knew more about the dangers of viruses. As hypothesized, people from Hubei province (an area with most serious pandemic levels) reported stronger fear. As expected, patients and medical staff members reported the strongest fear, especially patients who were confirmed and suspected cases. However, recovered patients reported relatively lower fear, which was consistent with reporting regarding SARS (Tse et al., 2003). These results allow us to identify the populations that most need emotional guidance, and to focus limited psychological resources during epidemics.

In this investigation, participants who thought “This is a severe outbreak,” “The pandemic is close to me,” and “I am in danger” had higher levels of fear. This “cognitive fear” (Song et al., 2018) increased the fear levels significantly.



Therefore, early and reasonable risk perception interventions are particularly important when adjusting fear in the Chinese population. This study have shown that cognitive reappraisal, expressive suppression and negative inhibition were negatively correlated with fear emotion; while positive expressivity, negative expressivity, positive/negative impulse strength were positively correlated with fear emotion. In Chinese culture, expressive suppression was not entirely an inappropriate regulation strategy. East Asian culture emphasized avoiding hurting others and striving to maintain harmonious relationships, suppression was associated with better social functioning (Butler et al., 2007; Soto et al., 2011; Yuan et al., 2015). For example, a study of insurance workers in Hong Kong showed that the increase of suppression was associated with fewer negative emotions (Yeung and Fung, 2012). Another study showed that Asian-Americans who rated suppression as more valuable had better emotional responses to anger elicited (Mauss and Butler, 2010). Similarly, among Chinese college students, the relationship between suppression and interpersonal harmony was significantly positive (Su et al., 2012; Wei et al., 2013). Thus, when people experience fear emotion during an epidemic, they can modulate it through the selection of an emotional regulation strategy, i.e., greater cognitive reappraisal and expressive suppression and less expression are recommended.

### **Prediction of Demographic Factors and Psychological Factors for Fear**

As seen from the regression analysis, we could see that being unmarried, having a relatively high educational level, and living in a city or area with fewer confirmed cases were protective factors for fear. Being of older age, female, having studied at the postgraduate or higher educational level, being a patient or medical staff members were risk factors. After controlling for demographic factors, cognitive reappraisal, positive expressivity and negative inhibition were protective factors for fear, and risk perception, negative expressivity, and positive/negative impulse strength were risk factors. This study systematically explored the protective and risk predictors of fear taking into account demographic and psychological variables. These findings will help focus on specific populations most in need of future psychological interventions and offer further evidence to support the development of more effective psychological training programs.

### **Prediction of Fear and Avoidant Behavior Tendency on Physical Function**

We found that fear increased avoidant behavior tendencies and significantly disturbed physical function. This is consistent with a large number of studies, confirming that negative emotions are associated with a poor lifestyle, such as sleep and diet (Huang et al., 2013; Zhu et al., 2016; Cai et al., 2019; Li et al., 2019). Regression analysis indicated that the level of fear and avoidant behavior tendencies positively predicted disturbed physical function. The results suggested a bridging role of fear between risk perception, avoidant behaviors, and physical disturbance. Thus, to better maintain normal psychological and physical

function under crisis, intervention, and guidance on fear emotion is critical. Previously, the TAS for crisis intervention provided a framework for understanding clients' reactions during a crisis. This investigation broadened TAS theory through the inclusion of disturbed physical health, and helped to develop more targeted and directed early intervention to prevent these problems.

### **Limitations**

First, fear in the population was only assessed using one subjective item, and there was a lack of systematic objective evaluation. Second, there was a lack of in-depth exploration of the impact factors of fear, such as psychological resilience, coping style, and so on. Third, this was a cross-sectional study, which precludes causal conclusions. However, with a large sample that covered all provinces and areas of China, this study was sufficiently powerful to accurately reflect public fear in China during the COVID-19 pandemic. Moreover, this online investigation was carried out during the case increasing stage of the pandemic (from January 27 to February 11, 2020), which allowed clear observation regarding the trends of fear during this period.

### **CONCLUSION**

At the early stage of the epidemic, the Chinese public experienced a mild degree of fear which declined over time. Fear functions as a bridge between risk perception, avoidant behaviors, and physical disturbance. The protective factors (being unmarried, having a relatively high educational level, living in city or area with fewer confirmed cases, cognitive reappraisal, positive expressivity, and negative inhibition) and risk factors (being of older age, female, having a postgraduate or higher educational level, being a patient or medical staff member, risk perception, negative expressivity, and positive/negative impulse strength) for fear suggest that the government could establish a long-term psychological stress monitoring mechanism to grasp the psychological dynamics of the public under major emergencies in a timely way and provide effective psychological interventions. The current snapshot of public emotion offers theoretical evidence for psychological assistance and emotional guidance during a crisis, and provides suggestions as to how best to deliver psychological support in future major public health emergencies.

### **DATA AVAILABILITY STATEMENT**

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

### **ETHICS STATEMENT**

The studies involving human participants were reviewed and approved by the Human Research Ethics Committee of the Army Medical University of China and Wenjuanxing online platform (www.wjx.top). The participants provided their written informed consent to participate in the study.



## AUTHOR CONTRIBUTIONS

QD designed the study, collected the data, and reviewed and revised the manuscript. BC collected and analyzed the data and final manuscript. XS and FX assisted the data collection and contributed to the manuscript writing. MZ, SS, ZC, YY, PS, XQ, YL, and YW assisted the data collection. All authors have read and approved the submitted version.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.567364/full#supplementary-material>

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# Perfectionism and Eating Behavior in the COVID-19 Pandemic

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The novel coronavirus disease 2019 (COVID-19) represents a massive global health crisis leading to different reactions in people. Those reactions may be adaptive or not depending on situational or psychological processes. Disordered eating attitudes and behaviors are likely to be exacerbated by the pandemic through multiple pathways as suggested by Rodgers et al. (2020). Among the psychological variables that may have increased dysfunctional eating attitudes and behaviors as a consequence of the social distancing and isolation, we looked at perfectionism. Perfectionism is a well-recognized risk and maintaining factor of eating-related symptoms and interact with stress increasing the probability of dysfunctional reactions (e.g., Wang and Li, 2017). The present study investigated the relationship between multidimensional perfectionism and eating behaviors by considering the mediating role of psychological distress. Data were collected from two countries (Italy and Spain) by means of an online survey. The samples included 465 (63.4% female) participants from Italy and 352 (68.5% female) from Spain. Participants completed the short form of the Hewitt and Flett Multidimensional Perfectionism Scale (Lombardo et al., 2021) to assess self-oriented, other-oriented and socially prescribed perfectionism, as well as the short form of Three Factors Eating Questionnaire (Karlsson et al., 2000) and the Italian version of Depression Anxiety and Stress Scale-21 (Bottesi et al., 2015), respectively used to assess restrictive, emotional and uncontrolled eating on one hand, and depression, anxiety and stress on the other. Multigroup analysis was performed to test the hypothesized model. Results showed that other-oriented and socially prescribed perfectionism were indirectly related to most of the dysfunctional eating aspects through the mediation of psychological distress, and the pattern obtained was consistent in both countries. These findings evidence that the psychological distress potentially related to the COVID-19 disease mediates the negative impact of interpersonal perfectionism and the tendency to eat in response to negative emotions.

**Keywords:** COVID-19, perfectionism, multidimensional, mediation, eating behavior, stress

## INTRODUCTION

The novel coronavirus disease 2019 pandemic (COVID-19; World Health Organization [WHO], 2020) has spread to most countries in the world and represents a massive global health crisis. To date, the number of COVID-19 patients has increased dramatically, with 4,320,946 currently positive cases in the world. Moreover, as suggested by the CDC<sup>1</sup>, governors of most

<sup>1</sup><https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html>

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countries ask to all citizens to adopt social distancing, quarantine and isolation as strategies for containment. According to the Stress Theory (Norris et al., 2002), public emergencies may trigger negative emotions and enhance dysfunctional cognitive beliefs, predisposing people to mental health difficulties. The COVID-19 pandemic is one of the most stressful situations for its own unpredictability and prolonged social isolation, therefore, it is crucial to understand the potential psychological outcomes influenced by this health emergency. Different reactions of people to the COVID-19 pandemic may involve their personality, as dispositional traits may shed light on people's different reactions (Blagov, 2020). Findings from personality research have highlighted that personality-related variables could profoundly change the impact of stress in challenging situations (Greene et al., 2020). Personality traits play an essential role in predicting coping strategies with emotional distress in stressful events and have significant consequences on mental health (Kessler, 1997).

One of the personality dimensions potentially implicated is perfectionism, a multidimensional personality characteristic composed by two major dimensions, namely perfectionistic strivings (i.e., incessantly demanding perfection of oneself) and perfectionistic concerns (i.e., extreme concern over mistakes and others' evaluations; see Stoeber and Otto, 2006). These two dimensions respectively reflect adaptive and maladaptive facets of perfectionism since they showed opposite associations with psychological adjustment and well-being (see Limburg et al., 2017, for a review). Hewitt and Flett (1991) developed a multidimensional model of perfectionism that distinguishes inter and intrapersonal facets reflecting both perfectionistic strivings and perfectionistic concerns. According to this model, self-oriented perfectionism (SOP), a key aspect of perfectionistic strivings, refers to the tendency to set high standards and the belief that striving for perfection is personally crucial. Socially prescribed perfectionism (SPP) refers to the perception that other people place unrealistic expectations for oneself and reflects perfectionistic concerns. Other oriented perfectionism (OOP) involves the tendency to expect that others should achieve unrealistic outcomes (Hewitt and Flett, 1991), and is typically conceptualized as a component of perfectionistic concerns (see Limburg et al., 2017), although some authors suggested it should be considered as a unique distinct form (e.g., Sherry et al., 2016). These aspects of perfectionism show different associations with mental well-being and maladjustment. More specifically, SPP is a maladaptive form of perfectionism as it results significantly related to negative characteristics and psychological distress (e.g., Stoeber and Yang, 2010). OOP is an ambivalent form of perfectionism, sometimes associated with positive, sometimes with dysfunctional outcomes (Stoeber, 2012). On the other hand, SOP has been proposed as the adaptive side of perfectionism (Stoeber and Otto, 2006), more consistently associated with functional outcomes (Lee et al., 2012), although its adaptive nature is still debated (Molnar et al., 2012).

Perfectionism increases concerns about under achievements, especially in stressful situations (Hasel and Besharat, 2011), as it plays an important role in modifying psychophysiological responses to psychosocial or environmental stress. Research has also shown that individuals with perfectionism display higher

levels of distress than non-perfectionists and use ineffective strategies to cope with life challenges (Dunkley et al., 2003; Wagner, 2016). Their greater perception of stress is generated by the pursuit of unrealistic standards which often end in failure (Flett et al., 2020).

Studies available in literature employing the Hewitt and Flett (1991) model showed mixed findings concerning the relationship between perfectionistic facets and perceived stress. Some authors found positive associations between perceived stress and SOP and SPP (Molnar et al., 2012) and non-significant results concerning OOP (Smith et al., 2017). However, in some cases, positive correlations between OOP and perceived stress were observed (Chang and Rand, 2000). Meta-analytic evidence on the associations between perfectionism and general psychological distress indicated larger effects for perfectionistic concerns (e.g., SPP) relative to perfectionistic strivings (e.g., SOP), thus confirming the dual nature of the construct in explaining perceived stress (Limburg et al., 2017).

When people with high perfectionism perceive stress, they are also more prone to report psychopathological difficulties like anxiety (see Burgess and Di Bartolo, 2016), depression (Flett et al., 2016), and eating disorders (e.g., Mello, 2016).

Perfectionistic individuals are more likely to develop maladaptive eating attitudes (Machado et al., 2014) with evidence showing that both the major dimensions discussed above (i.e., perfectionistic strivings, perfectionistic concerns) equally contribute to explaining variance in dysfunctional eating outcomes (Limburg et al., 2017). It was observed that the association between perfectionistic dimensions and eating symptoms increased in magnitude under stress situations (Ruggiero et al., 2003; Sassaroli and Ruggiero, 2005). Moreover, findings showed that stress triggers maladaptive eating behaviors in individuals with high perfectionistic concerns, thus suggesting that the mechanism underlying the association between perfectionism and eating symptoms may be related to stress. This issue was addressed in a cross-sectional study examining the mediating role of stressful life events in the relationship between self-evaluative perfectionism (i.e., maladaptive form of perfectionism) and eating disorder symptoms (Mello, 2016). Results show that stress partially mediates this association. More specifically, high self-evaluative perfectionism was associated with high perceived stress, that, in turn, explained significant variance in eating symptoms. A more recent work proposing a mediation model tested the impacts of adaptive and maladaptive facets of perfectionism on emotional eating through perceived stress (Wang and Li, 2017). Emotional eating consists of the propensity for eating in response to negative emotions (Hawks et al., 2003), and resulted to be high among individuals who experienced stress (Tan and Chow, 2014). Authors found that maladaptive perfectionism was positively associated with stress, which in turn aggravated emotional eating behavior. Differently, the indirect effect of adaptive perfectionism on emotional eating through stress was significantly negative, suggesting that adaptive perfectionists are less vulnerable to emotional eating even when stressed. Taken together, these findings suggest that stress may be crucial to understand the complex relationship between perfectionism and eating-related symptoms.



In this theoretical framework, the present study aimed to investigate whether psychological distress during the COVID-19 pandemic mediates the relationship between perfectionistic aspects and dysfunctional eating behaviors. More specifically, three cognitive and behavioral components of eating were analyzed, namely cognitive restraint (i.e., the tendency to consciously restrict food intake), uncontrolled eating (i.e., overeating after being exposed to food cues) and emotional eating (i.e., the propensity to eat in response to negative emotions). Individuals rigidly engaging in dietary restraint by limiting food/calories often experience higher disinhibition that in turn might lead to losing control resulting in overeating and subjective feelings of food craving (Keränen, 2011). These three eating behaviors resulted to be closely related to psychological distress as normally the perception of stress can facilitate unhealthy eating in people (e.g., Richardson et al., 2015).

The proposed model was tested in Italy and Spain, the two main European countries most affected by the 2019 coronavirus disease, reporting respectively more than 105,000 and 94,000 total confirmed cases as of April 1st, 2020 (World Health Organization [WHO], 2020). Both countries have faced similar outbreaks since the beginning of the infection spread, showing a rapid increase in both positive cases and deaths compared to other European countries (Giangreco, 2020). Indeed, Spain suffered a surge in the pandemic within a few days which forced the country to follow Italy in the exceptional prevention measures, thus implementing quarantine in less than a week away.

Concurrently, previous research on personality has also provided evidence to support the presence of cultural differences in the correlates of perfectionism (e.g., Francisco et al., 2015), as well as in latent mean scores (e.g., Pietrabissa et al., 2020). Among these, the study carried out by Francisco et al. (2015) has demonstrated that the direct and indirect role of perfectionism on body dissatisfaction varies between Portuguese and Spanish adolescents, despite belonging to two neighboring countries of the southern Europe. In addition, a very recent study reported significantly lower latent factor mean of self-oriented and socially prescribed perfectionism in Italians than in Spaniards (Pietrabissa et al., 2020).

Although Italy and Spain share similar lifestyles, cultural heritages and religious and family values that are less marked, or not present, in other European countries (Micheli, 2012), they remain distinct countries. For example, Italy exhibited an individualistic tendency focused more on competition, results and success rather than on quality of life, unlike Spain (Hofstede et al., 2005). This difference has displayed an important effect on the predictive role of the two dimensions of perfectionism on various psychological outcomes (e.g., Stoeber et al., 2013). Therefore, in addition to clarifying the role of psychological distress due to the COVID-19 pandemic, an attempt was made to investigate possible cross-cultural differences in the proposed model considering two distinct, albeit culturally similar, countries.

It was hypothesized that the three perfectionistic components derived from the Hewitt and Flett's (1991) model would be related to psychological distress that, in turn, would impact eating behaviors. The effect of perfectionistic dimensions (i.e., SOP,

SPP, OOP) on psychological distress was estimated to be different according to the specific dimension analyzed. Previous evidence suggested that these aspects of perfectionism showed different associations with indices of stress and evidence is mixed. For instance, SPP resulted to be consistently positively related to perceived stress (e.g., Smith et al., 2017). Results on SOP revealed non-significant associations with stress in some cases (e.g., Flett et al., 2016), otherwise some authors found that high SOP predicts high distress (Molnar et al., 2012). Evidence on OOP suggested that it did not play a significant role in stress (e.g., Aryani and Koesma, 2020) although other studies showed significant positive OOP-stress associations (Han and Park, 2019).

Basing on these findings, the present study aims to get some additional insights for answering the following questions:

- Which dimensions of perfectionism are related to psychological distress? In other words, considering the relative adaptiveness of SOP and OOP continues to be controversial (e.g., Molnar et al., 2012; Han and Park, 2019; Aryani and Koesma, 2020) should these dimensions be considered adaptive or maladaptive?
- Does psychological distress (i.e., stress experienced during the COVID-19 pandemic) mediate the relationship between perfectionistic aspects and disordered eating attitudes and behaviors, as indicated by previous evidence (e.g., Wang and Li, 2017)?
- Which dimensions of perfectionism are related to disordered eating attitudes and behaviors when we take into account the psychological distress? Systematic evidence shows that both perfectionistic concerns (i.e., SPP, OOP) and perfectionistic strivings (i.e., SOP) are relatively equally related to eating disturbances (see Limburg et al., 2017) but it is not clear whether this effect is direct or is fully mediated by other relevant variables like the impact of stress.
- Are there key cross-cultural differences in any of the associations described above in two distinct national cultures (Italy versus Spain)?

## MATERIALS AND METHODS

### Participants

The study involved three samples of participants: two recruited in Italy from April 26th to May 2nd 2020, and one recruited in Spain from April 26th to May 9th 2020. The first Italian sample (i.e., *psychometric sample*) included 360 participants (42.5% male; mean = 22.99 years; SD: 5.76; range: 18–77) recruited with the aim to validate the Italian short version of the Three-Factor Eating Questionnaire (TFEQ; Karlsson et al., 2000). The remaining main samples were recruited from Italy and Spain in order to test the hypothesized model and invariance across countries. The Italian main sample comprised 465 participants (35.9% male; mean = 36.76 years; SD: 12.86; range: 18–72), of which the 0.4% was tested and resulted positive for COVID-19 and the 6% was subjected to special restrictions related to their

health (e.g., mandatory quarantine). The Spanish main sample comprised 352 participants (31.5% male; mean = 38.05 years; *SD*:13.96; range: 18–71), of which the 1.1% was tested and resulted positive for COVID-19 and the 14.5% was subjected to restrictions related to their health. At the time of the survey, Italy had imposed a national lockdown for about 7 weeks, while Spain had set the lockdown for about 6 weeks. A greater portion of the Italian main sample reported to respect every day the provided restrictions (80.6%), compared to the Spanish one (74.7%). As detailed in **Table 1**, the two main samples resulted statistically different only on the education level ( $\chi^2 = 66.15; p < 0.001$ ), while no differences emerged on age [ $F_{(1,815)} = 1.89; p = 0.17$ ], gender composition ( $\chi^2 = 4.17; p = 0.12$ ), marital status ( $\chi^2 = 7.98; p = 0.16$ ), family income ( $\chi^2 = 0.64; p = 0.89$ ), as well as on Body Mass Index [ $F_{(1,815)} = 1.67; p = 0.2$ ].

### Procedure

All participants were contacted through a non-random convenience recruitment procedure: information related to the study and the link for filling the questionnaires in were spread through acquaintances, word of mouth and social media. The Italian-language version of the survey was identical in content to the Spanish-language version, and both were hosted on the same secure Internet-based survey-hosting platform (i.e., Survey Monkey). Participants were required to indicate

agreement with the informed consent document explaining the purpose of the study and highlighting the ethical principles (i.e., confidentiality of information, voluntary participation, withdrawal from participation at any time) before they could enter the survey. Participants were eligible to participate if: (1) they were living either in Italy or Spain at the time of the survey, and (2) they aged 18 or more years old. These inclusion criteria were set to ensure that participants adequately represented the two cultures understudy during the pandemic period. This study was conducted in accordance with the Helsinki Declaration and received approval from the Institutional Review Board of the Department of Psychology, Sapienza University of Rome.

### Instruments

All the respondents filled out the online questionnaire measuring the following key variables in Italian and Spanish language, respectively for both Italian samples and the Spanish sample.

### Socio-Demographic Characteristics

The questionnaire assessed participants' age, gender, marital status, education, family income, and information related to the COVID-19 pandemic.

**TABLE 1 |** Socio-demographic characteristics of the samples.

Characteristics	Italian psychometric Sample (n = 360) Mean (SD) Frequency (%)	Main samples		Main samples comparison	
		Italy (n = 465) Mean (SD) Frequency (%)	Spain (n = 352) Mean (SD) Frequency (%)	F $\chi^2$	P
Age (years)	22.99 (5.76)	36.76 (12.86)	38.05 (13.96)	1.89	0.169
<b>Gender</b>				4.17	0.124
Male	153 (42.5%)	167 (35.9%)	111 (31.5%)		
Female	207 (57.5%)	295 (63.4%)	241 (68.5%)		
<b>Marital status</b>				7.98	0.157
Married/Cohabiting	24 (6.7%)	209 (44.9%)	143 (40.6%)		
Separated	/	8 (1.7%)	5 (1.4%)		
Divorced	/	9 (1.9%)	18 (5.1%)		
Widowed	/	6 (1.3%)	5 (1.4%)		
Never married	336 (93.3%)	232 (49.9%)	181 (51.4%)		
Other	/	1 (0.2%)	/		
<b>Level of education</b>				66.15	<0.001
Primary school	/	/	8 (2.3%)		
Lower secondary school	3 (0.8%)	17 (3.7%)	23 (6.5%)		
Upper secondary school	267 (74.2%)	144 (31%)	49 (13.9%)		
Undergraduate/Master	76 (21.1%)	222 (47.7%)	150 (42.6%)		
Ph.D.	12 (3.3%)	78 (16.8%)	107 (30.4%)		
Scholar/Specialization					
Other	2 (0.6%)	4 (0.9%)	15 (4.3%)		
<b>Family income</b>				0.638	0.888
Very low	5 (1.4%)	8 (1.7%)	5 (1.4%)		
Low	44 (12.2%)	70 (15.1%)	51 (14.5%)		
Middle	280 (77.8%)	340 (73.1%)	265 (75.3%)		
High	31 (8.6%)	47 (10.1%)	31 (8.8%)		
Very high	/	/	/		
<b>Body mass index (kg/m<sup>2</sup>)</b>	22.41 (3.13)	23.74 (4.19)	25.02 (20.80)	1.67	0.196

### Multidimensional Perfectionism

Participants' perfectionism was assessed using the short version of the Hewitt and Flett Multidimensional Perfectionism Scale (HFMPs; Hewitt et al., 2008), consisting of 15 items, 5 items for each dimension, namely *self-oriented perfectionism* (SOP; e.g., "One of my goals is to be perfect in everything I do"), *socially prescribed perfectionism* (SPP; e.g., "The better I do, the better I am expected to do") and *other-oriented perfectionism* (OOP; e.g., "I have high expectations for the people who are important to me"). Items were rated using a 7-point Likert scale ranging from 1 (disagree) to 7 (agree), with higher scores indicating greater perfectionism. This brief version has previously validated for use in Italy (Lombardo et al., 2021), whereas for the Spanish sample we used the corresponding 15 items<sup>2</sup> from a previously validated Spanish long version of the scale (see Rodríguez Campayo et al., 2009). The reliability coefficients (i.e., Cronbach's Alpha) of the three HFMPs's sub-scales across the two main samples are reported in **Table 2**.

### Psychological Distress

The respondents' psychological distress was assessed using the Depression Anxiety Stress Scales (DASS; Lovibond and Lovibond, 1995), consisting of 21 items measuring three different aspects, namely *depression* (seven items, e.g., "I couldn't seem to experience any positive feeling at all"), *anxiety* (seven items, e.g., "I was aware of dryness of my mouth"), and *stress* (seven items, e.g., "I found it hard to wind down"). Respondents read statements about these constructs and record their answers using a 4-point Likert-type scale ranging from 0 (Did not apply to me at all) to 3 (Applied to me very much or most of the time). Past studies in Italy (Bottesi et al., 2015) and Spain (Daza et al.,

2002) have attested the validity and the reliability of the scale. The reliability coefficients (i.e., Cronbach's  $\alpha$ ) of the three DASS's sub-scales across the two samples of the present study are reported in **Table 2**.

### Eating Behaviors

Cognitive and behavioral components of eating were measured by the short version of the Three-Factor Eating Questionnaire (TFEQ; Karlsson et al., 2000), comprising 18 items with a 1–4 response scale. All item responses are dichotomized and aggregated into three sub-scales, namely *emotional eating* (EE, three items; e.g., "When I feel anxious, I find myself eating"), *uncontrolled eating* (UE, nine items; e.g., "Sometimes when I start eating, I just can't seem to stop") and *cognitive restraint* (CR, six items; e.g., "I consciously hold back at meals in order not to gain weight"). This short-form was validated for the use in Spain (Jáuregui-Lobera et al., 2014), whereas for the Italian version we provided a list of items selected from a previously Italian validated long version (Melchionda et al., 2003) and tested the factor structure in the first Italian subsample of the present study. Reliability coefficients (i.e., Cronbach's Alpha) of the three TFEQ's subscales across the three samples are reported in **Table 2**.

### Statistical Analyses

#### Reliability and Descriptive Analyses

Reliability and descriptive analyses as well as MANOVAs were carried out through the SPSS software (Statistical Package for the Social Sciences - IBM, 2017) version 25. More specifically, three MANOVAs were carried out to explore possible differences across countries (Italy vs. Spain) in participants' perfectionism, psychological distress, and eating behaviors.

#### Confirmatory Factor Analysis (CFA) of the Italian Version of the Tree Factor Questionnaire

In order to evaluate the factorial validity of the Italian 18-items Three-Factor Eating Questionnaire, using the data of the psychometric sample ( $n = 360$ ), a confirmatory factor analysis (CFA) was carried out using *Mplus* software version 7 (Muthén and Muthén, 2012) and the model parameters were estimated

<sup>2</sup>We preliminary evaluated the factorial structure of the Spanish short version of the HFMPs on the main Spanish sample using a Confirmatory Factor Analysis. The results showed that the three-factor structure of the scale fits the data almost well [ $\chi^2(87) = 401.013, p < 0.001$ ; CFI = 0.87, RMSEA = 0.10, 90% CI: from 0.091 to 0.111; SRMR = 0.095]. The standardized estimates of the factor loadings and other details can be provided on request by the first author. However, the factor loadings of each of the three latent variables assessed by the questionnaire were statistically significant ( $p < 0.001$ ) and were above 0.43.

**TABLE 2 |** Reliability coefficients and descriptive of the Key Measures across the Italian and Spanish main samples.

	Cronbach's $\alpha$		Mean (SD)		F	P	Partial Eta Squared
	Italy	Spain	Italy	Spain			
<b>Multidimensional perfectionism</b>							
Self-oriented perfectionism (SOP)	0.84	0.89	4.76 (1.25)	4.84 (1.29)	0.71	0.398	0.001
Other-oriented perfectionism (OOP)	0.75	0.77	4.18 (1.19)	4.05 (1.19)	2.25	0.134	0.003
Socially prescribed perfectionism (SPP)	0.73	0.75	3.81 (1.25)	3.52 (1.20)	10.87	0.001	0.013
<b>Psychological distress</b>							
Depression	0.89	0.86	0.82 (0.62)	0.62 (0.58)	21.58	<0.001	0.026
Anxiety	0.84	0.83	0.47 (0.49)	0.47 (0.54)	0.07	0.796	0.000
Stress	0.89	0.89	1.11 (0.62)	0.94 (0.69)	13.84	<0.001	0.017
<b>Eating behaviors</b>							
Emotional eating	0.85	0.85	2.12(0.83)	2.05(0.84)	1.44	0.230	0.002
Uncontrolled eating	0.86	0.90	2.05(0.60)	2.15(0.68)	4.80	0.029	0.006
Cognitive restrain	0.84	0.83	2.33(0.70)	2.28 (0.69)	0.95	0.331	0.001

using the default robust weighted least squares (WLSMV) estimation method with theta parameterization to account for the categorical nature of the 4-point response scale (Brown, 2015). The adequacy of the CFA was ascertained using a variety of indices measuring the degree of fit between input data and model-based estimates. The literature indicates the following as good fit model indices: TLI (Tucker-Lewis Index) or CFI (Comparative Fit Index) values close to 0.95 (Hu and Bentler, 1999), RMSEA (Root Mean Square Error of Approximation) values below 0.08 (Marsh et al., 2004) and WRMR (Weighted Root Mean Squared Residuals) values below 0.95 (close to 1.0 reasonable fit; Yu, 2002); a chi-square/df ratio below or equal to 3 (Kline, 1998).

### Measurement Invariance Analysis

Before testing the hypothesized model, the equivalence of the measurement model between countries (i.e., across the two main samples) is configured as a necessary condition for the comparison of psychological variables (Meredith, 1993). Although this was not the main purpose of our research, we considered it appropriate to conduct the measurement invariance separately for each of the three questionnaires we used for this study. In line with that, a series of multi-group confirmatory factor analyses (MGCFA) were modeled using maximum likelihood (ML) estimate, or the default robust weighted least squares estimate for ordinal data (WLSMV), via *Mplus* software version 7 (Muthén and Muthén, 2012), as follows (e.g., Meredith, 1993): (1) configural invariance, in which each common factor is associated with the same items across countries; (2) metric invariance, in which the items presented invariant factor loadings, but item intercepts are freely estimated across countries; (3) scalar invariance, in which both factor loadings and item intercepts (or thresholds for ordinal data) are constrained to invariance. According to Meredith (1993), the average item and scale scores are comparable across the two countries when scalar invariance is supported (Tomás et al., 2014).

For the purpose of the current study, the nested models of measurement invariance were compared against the configural invariance model using the change in CFI, TLI and RMSEA. Literature (Widaman, 1985; Cheung and Rensvold, 2002) states that a  $\Delta \leq 0.01$  for CFI and TLI, or  $\Delta \leq 0.015$  for RMSEA (Chen, 2007), indicates a not significant worsening of the fit model. The chi-square difference tests using the DIFFTEST command, in which a non-significant value ( $p > 0.05$ ) indicates good fit (Cheung and Rensvold, 2002), were also conducted to examine the ordinal data. However, if values exceeded these cut-offs criteria, partial invariance models were tested by releasing non-invariant parameters as stated by Byrne et al. (1989).

### Multi-Group Structural Equation Model (SEM) Analysis

Subsequently, we tested a model, across Italian ( $n = 465$ ) and Spain ( $n = 352$ ) main data, hypothesizing that perfectionism has direct and indirect effects (i.e., through its effect on psychological distress) upon eating behaviors (see **Figure 1**). Furthermore, the relations between these variables were tested controlling for the possible effect of participants' body mass index (BMI) on the

endogenous variables of the model (i.e., psychological distress and eating behaviors).

The hypothesized model was tested using a multi-group SEM analysis and the model parameters were estimated using the maximum likelihood (ML in *Mplus*) estimation method. More specifically, the multi-group analysis was carried out in order to evaluate firstly the model measurement invariance parameters across the two countries (i.e., Model 1- Metric invariance) and, subsequently, the extent to which the model's hypothesized relations held across them (i.e., Model 2-Covariances invariance and Model 3- Paths invariance).

In order to calculate the measurement indicators for the latent variables of the model, according to standard procedures for SEM analysis and following past studies (e.g., Lombardo et al., 2013), we used the three DASS's subscales (i.e., depression, anxiety, and stress) as measurement indicators of the latent variable psychological distress. Furthermore, an item parceling procedure (Kim and Hagtvet, 2003) was used for the other latent variables, in line with previous studies (e.g., Lucidi et al., 2014, 2019; Mallia et al., 2015). Specifically, the item parcels for each of these latent variables (i.e., self-oriented perfectionism, other-oriented perfectionism, social prescribed perfectionism, emotional eating, uncontrolled eating, and cognitive restraint) were created by randomly grouping the items of each scale into three separate item sets (parcels) and by averaging the item scores within each set.

For the multi-group analysis, the three models introducing the invariances (i.e., metric, covariances, and paths) across the two countries were compared against a configural invariance model using cut-offs listed above for acceptable change in CFI, TLI, and RMSEA. Finally, the indirect effects of the model were examined using bootstrapped confidence interval estimates (95% confidence interval with 5000 bootstrap resamples).

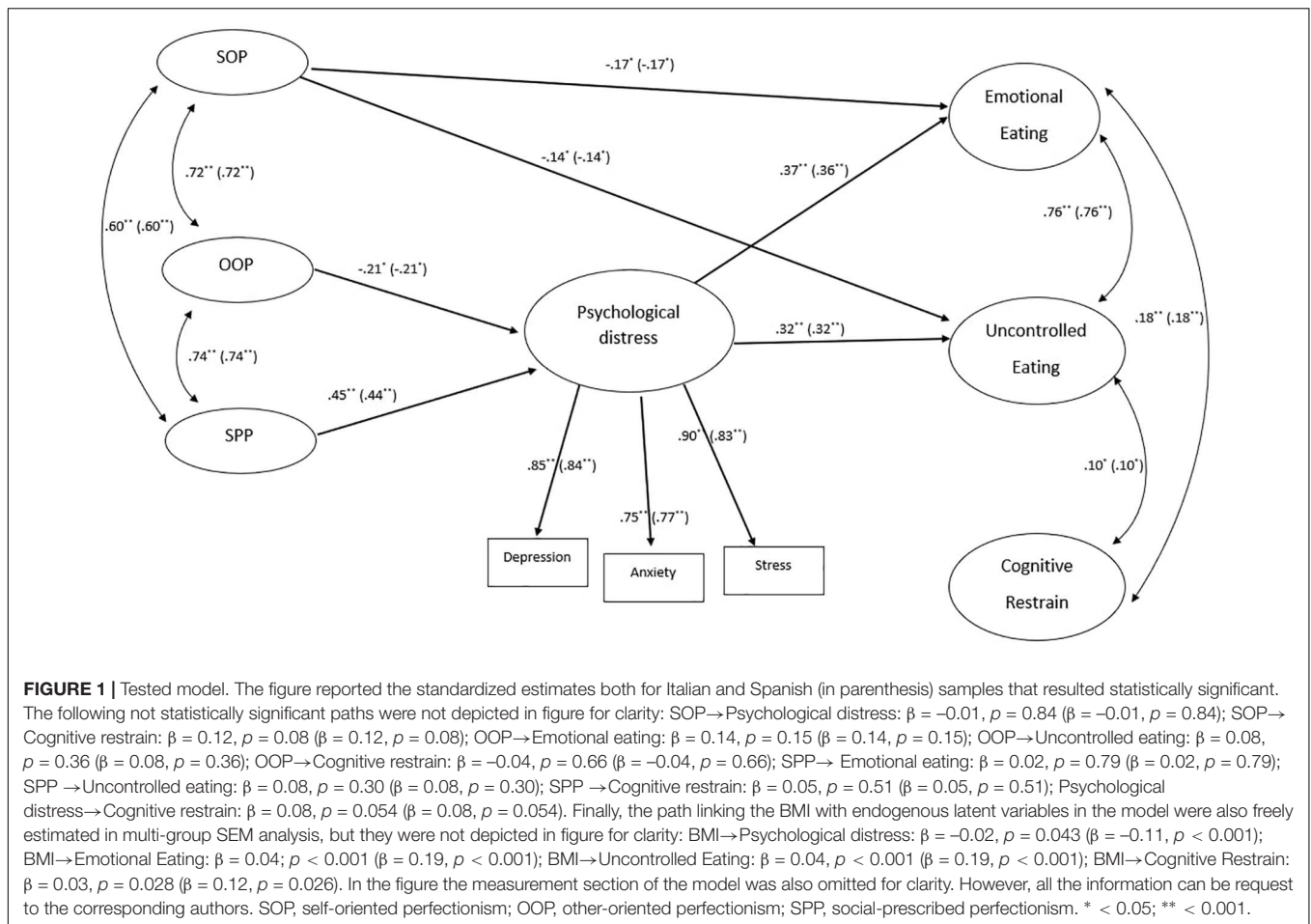
## RESULTS

### Reliability and Descriptive of the Key Measures of the Study

Overall, as reported in **Table 2**, all the key measures used in the present study showed acceptable internal consistency both in the Italian (Cronbach's  $\alpha \geq 0.73$ ) and in the Spanish (Cronbach's  $\alpha \geq 0.75$ ) main samples.

The MANOVAs results showed a significant multivariate effect of the country on the perfectionism [Wilks's  $\lambda_{(3,813)} = 0.976$ ;  $p < 0.001$ ;  $\eta_p^2 = 0.024$ ], on the psychological distress [Wilks's  $\lambda_{(3,813)} = 0.947$ ;  $p < 0.001$ ;  $\eta_p^2 = 0.053$ ] as well as on eating behaviors [Wilks's  $\lambda_{(3,813)} = 0.976$ ;  $p < 0.001$ ;  $\eta_p^2 = 0.024$ ]. However, considering the univariate effects, as reported in **Table 2**, emerged a significant difference across the two countries only on the socially prescribed perfectionism dimension, on depression and anxiety, and on uncontrolled eating. More specifically, the Italian respondents reported higher levels of socially prescribed perfectionism, higher levels of depression and anxiety, and lower levels of uncontrolled eating when compared with the Spanish respondents.





### Confirmatory Factor Analysis of the Italian Version of the Tree Factor Questionnaire

The CFA conducted on the Italian psychometric sample showed that the three-factor structure of the Tree Factor Questionnaire fits the data well [ $\chi^2_{(132)} = 365.892, p < 0.001; \chi^2_e/df = 2.77, CFI = 0.96, TLI = 0.953, RMSEA = 0.070, 90\% CI: \text{from } 0.062 \text{ to } 0.079; WRMR = 1.23$ ]. The standardized estimates of the factor loadings are reported in **Appendix 1**. All factor loadings of each of the three latent variables assessed by the questionnaire were statistically significant ( $p < 0.001$ ) and were above 0.50.

### Measurement Invariance of the HFMPs, DASS, and TFEQ Measures Across Italian and Spanish Samples

We compared the fit of the three models to evaluate measurement invariance of the key measures of the study across the two countries. Scalar invariance, or at least partial scalar invariance, was achieved with several revisions necessary to satisfy the cut-offs criteria.

First, the HFMPs measure showed an acceptable fit of the model at the configural invariance step after correlating

the residuals of item 2 and 1, and of item 14 and 11 [ $\chi^2_{(170)} = 617.134, p < 0.001; CFI = 0.91, TLI = 0.89, RMSEA = 0.08, 90\% CI: \text{from } 0.073 \text{ to } 0.087; SRMR = 0.073$ ]. Changes in fit indices supported metric invariance ( $\Delta CFI = 0.001, \Delta TLI = 0.006, \Delta RMSEA = 0.002$ ), while they did not support scalar invariance initially ( $\Delta CFI = 0.072, \Delta TLI = 0.062, \Delta RMSEA = 0.021$ ). Inspection of the modification indices indicated that five item intercepts were non-invariant across countries (i.e., intercepts of item 12, 7, 11, 1, and 8). Thus, partial scalar invariance was supported after removing the equality constraints on these item intercepts ( $\Delta CFI = 0.013, \Delta TLI = 0.001, \Delta RMSEA = 0.001$ ) and testing the practical significance of differential item functioning (DIF) across countries. In the present study, the difference  $d$  was trivial ( $d < 0.20$ ; Chan, 2000).

Second, the DASS measure displayed an acceptable fit of the model at the configural invariance step [ $\chi^2_{(372)} = 997.743; p < 0.001; CFI = 0.97, TLI = 0.97, RMSEA = 0.064, 90\% CI: \text{from } 0.059 \text{ to } 0.069; WRMR = 1.604$ ]. Also, despite the significant chi-square difference, changes in the fit indices supported the metric invariance step [ $\Delta \chi^2_{(18)} = 36.625; p = 0.006; \Delta CFI = 0.006; \Delta TLI = 0.008; \Delta RMSEA = 0.008$ ], and the scalar invariance step [ $\Delta \chi^2_{(60)} = 594.922; p < 0.001; \Delta CFI = 0.012; \Delta TLI = 0.005; \Delta RMSEA = 0.004$ ].

Lastly, fit indices for the configural invariance step of the TFEQ measure fell within specified ranges [ $\chi^2_{(264)} = 725.688$ ;  $p < 0.001$ ; CFI = 0.97, TLI = 0.96, RMSEA = 0.065, 90% CI: from 0.060 to 0.071; WRMR = 1.752]. Moreover, changes in fit indices suggested that the fit of the metric invariance step was not significantly worse from that the configural model [ $\Delta\chi^2_{(15)} = 23.617$ ;  $p = 0.0719$ ;  $\Delta$ CFI = 0.002,  $\Delta$ TLI = 0.004,  $\Delta$ RMSEA = 0.004], but the scalar invariance step showed a deterioration in fit:  $\Delta\chi^2_{(51)} = 501.063$ ;  $p < 0.000$ ;  $\Delta$ CFI = 0.018,  $\Delta$ TLI = 0.01,  $\Delta$ RMSEA = 0.008. Inspection of the modification indices indicated that the main source of the misfit can be traced to one non-invariant threshold (item 1 threshold 2). Despite the chi-square difference was again significant [ $\Delta\chi^2_{(50)} = 358.191$ ;  $p < 0.000$ ], the changes in the fit indices compared to the configural model supported the partial scalar invariance by freeing this item threshold across countries ( $\Delta$ CFI = 0.012,  $\Delta$ TLI = 0.001,  $\Delta$ RMSEA = 0.001).

### The Relationships Between Perfectionism, Psychological Distress, and Eating Behaviors Across Italian and Spanish Samples

Table 3 shows the results of the multi-group analysis, which was performed to verify the metric invariance, the covariances invariance and, finally, the path invariance of the hypothesized model across the two countries. In particular, the baseline model (i.e., M0 – Configural invariance) showed a good fit, attesting that the hypothesized model fit well both the Italian and the Spanish data. Furthermore, the comparisons between the models introducing three different constrains/invariances across the two samples showed not significant differences, since all the observed  $\Delta$  CFIs are smaller than the recommended cut-offs (0.01). These results attested firstly that the factor loadings of the indicators used for each latent variable of the model resulted statistically equivalent across the two countries (i.e., metric invariance of the models). Additionally, the results attested also that the covariances between the latent variables of the model as well as the paths linking these variables resulted statistically equivalent across Italian and Spanish data (i.e., covariance and path invariance respectively). In particular, as reported in Figure 1, self-oriented perfectionism (i.e., SOP) showed a negative direct link both with emotional eating ( $\beta = -0.17$ ) and with uncontrolled eating ( $\beta = -0.14$ ). Other oriented perfectionism, instead, showed only indirect negative effects both

on emotional eating ( $\alpha\beta = -0.082$ ; 95% confidence interval: from  $-0.192$  to  $-0.007$ ) and uncontrolled eating ( $\alpha\beta = -0.072$ ; 95% confidence interval: from  $-0.166$  to  $-0.006$ ). Conversely, social prescribed perfectionism showed only indirect positive effects both on emotional eating ( $\alpha\beta = 0.177$ ; 95% confidence interval: from 0.109 to 0.300) and uncontrolled eating ( $\alpha\beta = 0.155$ ; 95% confidence interval: from 0.094 to 0.257).

## DISCUSSION

The present study investigated whether the psychological distress evaluated during the COVID-19 pandemic mediates the relationship between perfectionistic dimensions and problematic eating attitudes and behaviors in two samples drawn from the general population of Italy and Spain.

Findings showed that the psychological distress evaluated during the COVID-19 pandemic mediated the relationship between two perfectionistic dimensions and problematic eating behaviors in both the samples included. More specifically, results confirmed that psychological distress fully mediates the associations between the interpersonal aspects of perfectionism (i.e., SPP, OOP) and two of the three dysfunctional eating behaviors examined, namely emotional eating and uncontrolled eating. These results overlap with findings indicating that high perceived stress is associated with greater eating disorders symptoms (e.g., Klatzkin et al., 2019) as well as with components of perfectionistic concerns (i.e., SPP, OOP; Dunkley et al., 2016).

Path coefficients of each specific effect tested through the model indicated that participants with high SPP also show elevated psychological distress, that, in turn, is associated with greater levels of emotional eating and uncontrolled eating. This finding is consistent with previous results evidencing that maladaptive perfectionism positively predicts emotional eating through the mediation of stress (Wang and Li, 2017) and indicate that in the COVID-19 pandemic the link between perfectionism and eating symptoms is better explained by the mediation of the psychological distress. The role of SPP in predicting high psychological distress should be interpreted taking into account peculiarities of people with this perfectionistic aspect. Individuals with high SPP are prone to excessively concern over external expectations and pressures, and often engage in coping choices that did not match with the daily situational demands (Zhang, 2012). It is plausible that high SPP individuals may experience elevated stress in

TABLE 3 | Multi-group SEM: Models comparisons.

Model	Chi-square	df	CFI	TLI	RMSEA	SRMR	Chi-square/df	Comparison	$\Delta$ CFI	$\Delta$ TLI	$\Delta$ RMSEA
Model 0 (M0) – Configural invariance	894.195	384	0.944	0.933	0.057	0.054	2.32				
Model 1 (M1) – Metric invariance (i.e., factor Loadings)	977.527	405	0.937	0.928	0.056	0.051	2.41	M1 vs. M0	0.007	0.005	0.001
Model 2 (M2) – Covariances invariance	983.967	411	0.937	0.928	0.058	0.051	2.39	M2 vs. M0	0.007	0.005	0.001
Model 3- (M3) – Paths invariance	1041.644	430	0.933	0.928	0.058	0.057	2.42	M3 vs. M0	0.011	0.005	0.001

dealing with the provisions introduced by the governments in COVID-19 pandemic (i.e., social distancing), and that this stress is detrimental for eating behaviors. Moreover, previous evidence suggested that SPP is related to perceived loneliness and isolation (e.g., Harper et al., 2020). Recently, the importance of social connection is highlighted to mitigate negative psychological consequences of the COVID-19 pandemic (Tull et al., 2020). We speculate that the distress related to COVID-19 pandemic may facilitate people with high SPP in experiencing social disconnection, leading to eat more than usual (i.e., uncontrolled eating) and eating in response to emotional cues (i.e., emotional eating). This hypothesis is consistent with research on the association between eating behaviors and loneliness (Levine, 2012) that indicated the tendency to overeating as distracting from perceived social isolation and stress (Wansink and Payne, 2007).

Findings also showed that OOP negatively impacts psychological distress, that, in turn, positively predicts emotional eating and uncontrolled eating. These results evidence that demanding perfection from others (i.e., OOP) is associated with low psychological distress. Previous studies found a negative relationship between OOP and stress (Chang and Sanna, 2001), suggesting that, under certain circumstances, OOP could have adaptive effects (Hunter and O'Connor, 2003). Individuals with OOP are continuously concentrated on others' performance thus it is possible that the tendency to direct the attentive focus away from self-scrutiny, in some circumstances, is beneficial (as cited in Hunter and O'Connor, 2003).

Additionally, results evidenced a not significant SOP-psychological distress association and a direct negative effect of SOP on emotional eating and uncontrolled eating. The lack of association between SOP and psychological distress is consistent with previous findings (e.g., Flett et al., 2016) and confirms the intrinsic functional nature of SOP. The adaptiveness of SOP is also suggested by the fact that participants with high SOP experienced low disturbed eating behaviors, and this relationship is independent of their perceived distress. This finding contradicts the well-established positive association between perfectionistic strivings (i.e., SOP) and eating symptoms (see Limburg et al., 2017). Instead, results suggest that SOP may play a protective role for the negative consequences of distress on emotional and uncontrolled eating. This conclusion is consistent with previous evidence showing that positive perfectionism (an aspect of perfectionism comparable to SOP) was related to low emotional eating levels (Wang and Li, 2017). Taken together, these observations suggest that adaptive perfectionists (i.e., those who have high SOP) may be less vulnerable to the tendency to overeat and to eat in response to negative emotions. It is plausible that the typical motivation to be flawless of individuals with high SOP makes them less prone to engage in uncontrolled eating and in eating in response to emotional cues in high-stress conditions. Empirical evidence showed that, among all the perfectionism dimensions, only SOP was significantly related to the rigid adherence to strict dietary rules (Brown et al., 2012), thus it is possible that during the public emergency of COVID-19 pandemic, high SOP may have lead people to rigidly interpret and adhere to guidelines for healthy eating.

No significant association was found for cognitive restraint. This result is inconsistent with results of previous studies evidencing a positive association between cognitive dietary restraint and perfectionism (e.g., Cain et al., 2008), as well as between this eating behavior and levels of perceived stress (e.g., McLean and Barr, 2003). Social isolation measures introduced for the containment of the COVID-19 pandemic (including stay-at-home mandates) may make it difficult for people to restrict eating with the intention to lose or maintain weight. Staying at home could facilitate the engaging in unhealthy behaviors such as overeating (as cited in Buenaventura et al., 2020) rather than cognitive restraint due to the easy access to food reserves (e.g., Rodgers et al., 2020).

Several limitations of the present study should be acknowledged before concluding. First, its cross-sectional nature limited causal inferences. Further longitudinal studies are needed to examine whether perfectionistic dimensions prospectively predict changes in eating behaviors, and if this association would be mediated by psychological distress. Second, the mere use of self-report questionnaires may be subject to social desirability effects and recall bias. More specifically, future studies should control for the effect of social desirability as previous evidence showed positive associations between the motivation to distort one's responses in a favorable direction (i.e., social desirability) and both perfectionism and psychological distress (e.g., Lopez et al., 2006; Kung and Chan, 2014). Further studies should include a measure of perceived social isolation in order to analyze the extent to which each aspect of perfectionism could be related to the experience of loneliness during COVID-19 pandemic. Moreover, the current study should be replicated in other cultures to strengthen the generalizability of the results.

Despite these limitations, the present study provides further evidence for the roles of each perfectionism dimension in eating behaviors by considering the mediation role of psychological distress. Strengths of the present work include the use of multi-group SEM as a rigorous way to examine the degrees of goodness-of-fit for the proposed model and to simultaneously compare parameters across the two groups (Italian and Spanish). The multi-group SEM has been regarded as a powerful model and recommended in cross-cultural research especially when computing pairwise comparison between countries (Feskens and Hox, 2011). Moreover, the establishment of measurement invariance of all the scales used strongly supported the generality of the model and warranted comparisons between the two cultural groups studied.

In summary, results of the present research suggest that the OOP and SPP dimensions resulted to indirectly predict emotional and uncontrolled eating, whereas non-significant mediation result was found for SOP. Instead, SOP was found to negatively predict eating behaviors, supporting the adaptive nature of SOP in relation to emotional eating and uncontrolled eating and suggesting its potential protective role in conditions of stress and social isolation. These findings have theoretical implications for the perfectionism and eating symptoms literature. For example, the negative effect of SOP on eating symptoms may be the consequence of controlling for the common variance shared with other perfectionistic dimensions.

Previous studies demonstrate that when the covariance between perfectionistic strivings (e.g., SOP) and perfectionistic concerns (e.g., SPP) was controlled for, perfectionistic strivings show negative associations with maladaptive outcomes (e.g., anxiety; Stoeber et al., 2007). This mechanism may also pertain eating disorders (EDs) symptoms, as one past study demonstrated (Minarik and Ahrens, 1996). Further research should shed light on these processes by employing sophisticated statistical methods to more deeply explore the simultaneous effects of SOP, SPP, and OOP on problematic eating behaviors.

Findings suggest some clinical implications for future research and interventions aimed at reducing problematic eating behaviors. A growing literature supports that programs targeting perfectionism may be an effective treatment for EDs (e.g., Wilksch et al., 2008; Goldstein et al., 2014). Generally, these interventions address multiple components of perfectionism (e.g., concern over mistakes, personal standards; Wilksch et al., 2008) and result in a reduction of EDs symptoms (e.g., shape and weight concerns, Wilksch et al., 2008; drive for thinness, Levinson et al., 2017). In the present investigation, the interpersonal perfectionistic aspects (i.e., SPP, OOP) showed significant indirect associations with eating symptoms, suggesting that intervention protocols for individuals suffering from EDs should especially address these forms of perfectionism, as previous studies highlighted (e.g., Reilly et al., 2016). EDs treatment targeting perfectionism typically emphasizes changes in the patient's scheme for self-evaluation and includes cognitive-behavioral methods to address personal standards and self-criticism (see Egan et al., 2014 for further details). Results of this study may imply that future prevention and treatment for problematic eating behaviors should mainly aim on the reduction of aspects related to SPP (e.g., fear of failure) and OOP (e.g., excessive other-criticism) rather than aspects of SOP, although evidence on the efficacy of EDs treatment designed to decrease SOP is available in the literature (e.g., Lethbridge et al., 2011). Instead, the present findings highlighted the protective role of SOP in the development and maintenance of problematic eating behaviors.

Whereas the reduction of perfectionistic concerns (e.g., SPP) through the use of specific techniques (e.g., self-compassion strategies) should be recommended, the drive to excel related to SOP could be re-addressed to enhancing motivation for change and to serve recovery in EDs treatment (Wagner and Vitousek, 2019). On the other hand, clinicians should pay special attention to the reduction of perceived distress. More specifically, treating perfectionistic concerns may result in a relative reduction of patients' psychological distress, which, in turn, would decrease the likelihood to engage in emotional eating and uncontrolled eating behaviors. Further investigations of specific treatment strategies targeting these processes are required.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board – Department of Psychology, Sapienza University of Rome. The participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

All the authors contributed to the study conception and design, and commented on previous versions of the manuscript. MV and ADM performed the material preparation, literature research, and data collection. ADM performed the statistical analyses with the supervision of LM. MV wrote the first draft of the manuscript. CL and LM read, corrected, and approved the final manuscript.

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**APPENDIX 1** | Standardized factor loadings of the short version of the Three Factor Questionnaire.

	<b>Emotionaleating</b>	<b>Uncontrolledeating</b>	<b>Cognitiverestrain</b>
Item 3	0.845*		
Item 6	0.934*		
Item 10	0.814*		
Item 1		0.660*	
Item 4		0.835*	
Item 5		0.726*	
Item 7		0.672*	
Item 8		0.831*	
Item 9		0.800*	
Item 13		0.774*	
Item 14		0.609*	
Item 17		0.716*	
Item 2			0.762*
Item 11			0.844*
Item 12			0.730*
Item 15			0.522*
Item 16			0.783*
Item 18			0.690*

\**p level < 0.001.*



# Comparative Analysis of Psychology Responding to COVID-19 Pandemic in Brics Nations

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The BRICS Forum, an independent international organization encouraging commercial, political, and cultural cooperation between Brazil, Russia, India, China, and South Africa, was formed in 2011, and these countries have a significant influence on their regional affairs. These nations were hit by COVID-19 at different times, and all adopted home quarantine to reduce the spread of the virus. We present a comparative analysis of actions of psychology and potential outcomes during the COVID-19 pandemic in BRICS nations regarding five aspects: psychology in health policies, social roles of psychology, socioeconomic context, actions for the general population, and health professionals during stage 1 of the pandemic, and possible actions in stage 2. Various types of actions were taken by psychologists in BRICS, with different levels of coordinated cooperation with respective governmental and non-governmental organizations, multiple and parallel efforts from different scientific societies, and professional regulatory agencies. Scientific societies have had an important role in coordinating some of these efforts, especially because they congregate the psychologists from different parts of these countries, improving communication and access to key information. The aim of these actions varies from improving situational skills and competences to increase the accessibility of psychological services and provide psychoeducation and telepsychology. We will consider the social importance of these actions within these countries as a global opportunity for psychology to stage in a complex context involving human health. The way psychology in BRICS will face this challenging situation is likely to produce important regional influence, stimulate scientific contribution, and increase the accessibility of psychology.

**Keywords:** COVID-19, BRICS forum, psychology, telepsychology, actions, health workers



## INTRODUCTION

BRICS is the group composed of five major emerging countries: Brazil, Russia, India, China, and South Africa, which, together, represent about 42% of the population, 30% of the territory, 23% of Global Gross Domestic Product (GDP), and 18% of the global trade. Since 2009, these countries have sought to establish fairer international governance, developed sectoral cooperation in different areas, such as science, technology and innovation, economics, finances, business, education, and security (BRICS-Brasil, 2019). The BRICS is an economic group composed of designating countries considered to be emerging, which have the economic potential to overcome the great world powers. It is not an economic block or an international institution but an international mechanism with a diplomatic character, which promotes the collective economic and political actions by these countries. Currently, sectoral cooperation, which covers more than 30 subject areas, brings important concrete benefits to the populations of the five countries.

As a major global health problem, COVID-19 is a central theme on the BRICS agenda for having an impact on the capabilities of health infrastructure and global economies, in addition to the important discussion on political management that is associated with the development of efficient actions in these countries. Psychological scientific societies of these countries are aware of these impacts, concerned with consequences for the mental health of the general population and, in particular, health professionals, with psychosocial actions aimed at different vulnerable groups (children, the elderly, people in vulnerability, and victims of violence), taking into account sociocultural differences and the particular attempt to strengthen health systems in these developing countries.

In this sense, this perspective article discusses the actions of psychology as a science and profession, represented by several scientific societies and councils, governmental and non-governmental organizations, and universities, in combating the pandemic of COVID-19, in the countries that form the alliance of the BRICS. This proposal is important, given that we are among the 25 countries that most produce science in psychology, in a list of 173 countries (<https://www.scimagojr.com/countryrank.php?area=3200&year=2019>). If the BRICS were a country (adding up all the scientific production would be 8,118 documents in 2019), we would be third in the scientific production of psychology, behind the USA and the UK, well-ahead of Germany. Therefore, we present an analysis of actions of psychology and potential outcomes just after the outbreak of COVID-19 in the BRICS nations regarding five aspects: psychology in health policies, social roles of psychology, socioeconomic context, actions for the general population, and health professionals during stage 1 of the pandemic, and possible actions in stage 2. Finally, we consider a comparative analysis of these actions. Before this analysis, we characterize the psychology in the BRICS countries.

## Characterization of Psychology in the Brics Countries

### Brazil

There are 350,000 registered psychologists in Brazil today (<http://www2.cfp.org.br/infografico/quantos-somos/>), working

in individual practice, healthcare, education, organizations, and research. Profession and formation have been regulated by Federal law No. 4,119 since 1962. Federal Council of Psychology (FCP) has been the organization responsible for professional registration and regulation since 1972. Brazilian Society of Psychology (BSP) has congregated all areas of scientific and professional psychology since 1971 (Williams and Hubner, 2014) and joined the International Union of Psychology Science (IUPsyS) in 1957.

In 2016, there were 626 courses of psychology (in public and private institutions) with 22,985 enrolled students, after the Higher Education project that intensified the expansion, democratization, interiorization, and internationalization of Higher Education (Dantas et al., 2019). Extensive supervised training during 5-year courses is mandatory in different areas of professional psychology. Therefore, universities and faculty are part of the public mental care service. Parallel to professional growth, scientific knowledge is produced in about 90 graduate courses and published internationally and by dozens of open-access national scientific journals linked to universities and scientific societies of different subfields of psychology.

Regarding mental health, SUS and Unified Social Assistance System (SUAS) have become important devices for the integration of professional psychologists in public policies since the 2000s. Both were responsible for the insertion of psychologists to the most diverse municipalities and locations in the country to a contingent, estimated in 8,000 psychologists in Reference Centers for Social Assistance (CRAS and CREAS) and 40,000 psychologists in SUS (Macedo et al., 2011). Unified Health System (SUS) serves more than 70% of the population. It works in regionalized care networks, integrating different levels of care complexity, from community Basic Health Units (UBS) to hospitals. The characteristics of the service provided vary according to the different regions of the country. In recent years, there has been an expansion of the inclusion of psychology in primary care, especially in the Family Health Strategy (ESF) and in Family Health Support Centers (NASF), where psychologists perform socio-educational activities, home visits, and clinical care. However, there is no clear role of psychology in health teams (Seidl et al., 2019), which contrasts with the traditional formation of psychologists and expectations of the users (Seidl et al., 2019).

### Russia

In Russia, more than 200 universities are engaged in the training of psychologists. Currently, according to the reports of the respected ministries, about 60,000 psychologists work in the field of education, in the healthcare sector, more than 30,000 psychologists; in the structure of law enforcement agencies, about 40,000 psychologists; in the system of social protection, more than 25,000 psychologists; in the HR system of organizations, about 50,000 psychologists; and more than 95,000 psychologists conduct individual practice.

The largest and oldest organization that unites professional psychologists in Russia is the Russian Psychological Society (RPS), one of the oldest psychological societies in the world, which was founded in 1885. The purpose of the creation of RPS was the development of “psychology, in its compositions, applications, and history, and the spread of psychological

knowledge in Russia (RPS).” Members of the society were world-famous scientists who have made substantial contribution to the formation and development of psychological science: L. S. Vygotsky, A. R. Luria, A. N. Leontiev, P. Ya. Galperin, and other leading scientists of the Russian Academy of Sciences and the Russian Academy of Sciences, leading psychologists of the largest scientific and educational organizations. Together with the Federal Educational and Methodological Association in the Field of Higher Education, RPS organizes scientific and methodological support for the preparation of federal state educational standards of higher professional education and basic professional educational programs in the field of psychological education.

## India

Psychology as a discipline started in 1916 when the first department of psychology was established at the University of Calcutta, India. Later, departments of psychology were established at the University of Mysore in 1924, University of Madras (1943), University of Kerala (1957), Utkal University (1958), University of Bombay (1959), Allahabad University (1961), and the University of Delhi (1964). Psychology was also introduced in the various Indian Institutes of Technology and Management setup later. During the years, various psychology associations were formed, and it is difficult to give the exact number of associations in the country. The Indian Psychological Association was established in 1925, Indian Psychoanalytic Society in 1922, and later on, Indian Association of Clinical Psychology, National Academy of Psychology (NAOP), Indian Academy of Applied Psychology, and several other associations focusing on health, school psychology, community psychology, counseling and guidance, and about 20 regional associations in the different states, besides numerous local chapters. The idea of a federation of associations has been mooted and felt important and announced in 2014, but much needs to be done. The focus of these associations has been more on academic work and awareness generation than psychological services, except for a few. The National Academy of Psychology (NAOP) is a member of the International Union of Psychological Sciences and participates regularly and actively in its programs. It is also a member of the Asia Pacific Association of Psychology and engages in collaborative endeavors, including programs in disaster management.

The Rehabilitation Council of India (RCI) regulates the professional programs in clinical and rehabilitation psychology (Brazilian Federal Government, 2020). Psychologists work in close association with professionals in allied disciplines, such as psychiatry, pediatrics, education, social work, nursing, rural development, rehabilitation, defense, and management. It may be noted that, with the realization of the complexity, the move is more toward multi- and trans-disciplinary initiatives. In India, there is no registry of psychologists in the country; hence, an accurate count is difficult. Manickam (2016) suggests that there may be more than 300 master-level programs of psychology with different specializations in the country and, perhaps, more than 100,000 psychologists based on the number of training centers

and the intake at each center (p. 5). This number may have increased in the last 4 years.

India has several institutions working for the mental health and well-being of its citizens. In 2017, the country passed a progressive Mental Healthcare Act, 2017 (The Mental Health Care Act, 2017) “to provide for mental healthcare and services for persons with mental illness and to protect, promote, and fulfill the rights of such persons during delivery of mental healthcare and services and for matters connected therewith or incidental thereto” (Government of India, 2017). The act also outlines the responsibilities of other agencies such as the police concerning people with mental illness as well as attempts to tackle the stigma of mental illness and its amelioration. Many current mental health-related services happening in the country are in the backdrop of this act. NIMHANS (National Institute of Mental Health and Neuro Sciences) is the major center for mental health and neuroscience education in the country. The institute provides a large number of mental health and well-being-related services. Several other institutions both in the government sector and the private sector are providing their services for mental health care, including many mental health professionals and clinical psychologists in various medical institutions and hospitals in the country. These institutions during COVID times are providing counseling and mental health facilities for the public as well as special groups like children, migrants, elderly, etc.

## China

Psychology as a discipline was established in China around the 1920s with several milestones achieved at that time, such as the first psychology laboratory (1917, Peking University), the first psychology department (1920, Nanjing Normal College), the Chinese Psychological Association (1921, the predecessor of Chinese Psychological Society, CPS), and the first research institute (1929), Institute of Psychology, Academia Sinica (the predecessor of Institute of Psychology, Chinese Academy of Sciences, IPCAS) (Han and Zhang, 2007). CPS is one of the earliest (seventh) national academic organizations in the world. It has 36 divisions and 12 committees for special task forces. Two other national associations of psychology are the Chinese Association of Social Psychology (1982) and the Chinese Association for Mental Health (1979).

CPS joined the International Union of Psychology Science (IUPsyS) in 1980, and the International Association of Applied Psychology (IAAP) in 1984. CPS hosted the 28th International Congress of Psychology, held in Beijing on August 8–13, 2004, under the auspices of IUPsyS. CPS and CAMH, jointly in cooperation with Beijing University (Department of Psychology), held the fifth World Congress of Psychotherapy in Beijing in October 2008. In 2 years, CPS will host the 30th International Congress of Applied Psychology in Beijing, July 2022.

Psychology is taught in China at both undergraduate and postgraduate levels, in 815 universities and institutes that offer postgraduate programs, 114 have master programs in psychology (psychology, mental health education) and 30 universities have doctoral level programs in psychology in 2020 (China Education online).

In 2002, the China Ministry of Labor and Social Security launched a certification for psychological counselors, based on the National Standards on Psychological Counseling. The new certification was given to 1.2 million counselors who fulfilled the basic requirement, took the training, and passed a national examination. It enables private psychotherapy practice and psychological counseling in general public settings, such as hospitals, universities, primary and secondary schools, entrepreneurs, and communities.

### South Africa

Regulation of the practice of medicine and allied professions in South Africa dates back to the late nineteenth century when the then Colonial Medical Council of the Cape Province was established in terms of Section 18 of the Medical and Pharmacy Act of 1891. At that time, the Cape Province was nominally under the British colonial rule, which lasted until 1910, when the Union of South Africa was formed in 1910. In 1928, the South African Medical and Dental Council (SAMDC) was appointed in terms of Act Number 13 of 1928, which was amended in 1974 (Health Professions Council of South Africa, 2020). Through a series of amendments, the SAMDC was subsequently replaced by the Health Professions Council of South Africa (HPCSA). The HPCSA consists of 12 professional boards, with the Professional Board for Psychology being one of them. The Professional Board for Psychology has the mandate to, among others, 1. Control and to exercise authority in respect of all matters affecting the education and training of persons in, and the manner of the exercise of the practices pursued in connection with, any health profession falling within the ambit of the professional board; 2. Maintain and enhance the dignity of the profession and the integrity of the persons practicing the profession (Health Professions Council of South Africa, 2020).

To practice in South Africa, a psychologist has to register with the HPCSA under any of the following categories: clinical, counseling, educational, industrial, or research. Besides, the HPCSA has provided for the registration of psychometrists and registered counselors who can be categorized as mid-level psychology professionals. Psychologists are expected to adhere to their scope of practice as outlined in the Regulations Defining the Scope of the Profession of Psychology.

One of the challenges that South Africa faces is the acute shortage of psychologists and other mental health professionals. A study by Docrat et al. (2019) has found that there were only 0.97 psychologists per 100,000 uninsured population in South Africa, between the years April 2016 and March 2017. Information obtained from the HPCSA indicated that, as of May 2, 2018, 8,773 psychologists were servicing a total population of ~57.78 million people in South Africa (Stats, 2019).

Apart from the statutory Professional Board for Psychology, there are several psychological associations operating in South Africa. The Psychological Society of South Africa (PsySSA) is the largest of these associations, with over 1,000 members (Psychological Society of South Africa, 2020). The society was formed in 1994 through an amalgamation of various psychological bodies that were in existence at that time.

## SECTIONS ASSESSMENT OF POLICY/GUIDELINES OPTIONS AND IMPLICATIONS

We present a comparative analysis of actions of psychology and potential outcomes during the COVID-19 in the BRICS nations regarding five aspects: psychology in health policies, social roles of psychology, socioeconomic context, actions for the general population, and health professionals during stage 1 of the pandemic, and possible actions in stage 2.

### Psychology in Health Policies Brazil

In Brazil, the first case of COVID-19 was reported around February 26, and quarantine began in several cities in March. By May, some cities enacted lockdown due to a high number of deaths. Since then, 349,113 cases have been confirmed, and 22,165 deaths occurred until May 24, 2020 according to the Brazilian Ministry of Health (2020b).

The Ministry of Health issued an ordinance n 639 on March 31, 2020, named “Brazil counts on me” (Brazilian Ministry of Health, 2020c) for recruiting health professionals, including psychologists, to work in cities with a shortage of workers. The TeleSUS made available information and guidance about COVID-19, using chat, apps, a telephone, and WhatsApp, aiming at increasing quarantine of potential cases or risk groups (<https://aps.saude.gov.br/apecoronatelesus>) but did not provide psychological care. Quarantine, lockdown, or other measures of social distancing were recommended at the discretion of governors and mayors but not by the Ministry of Health. In a controversial attitude, the Brazilian president not only did not recommend social distancing but also stimulated social gathering on public appearance in front of the official presidential palace, visiting shops and buying from street vendors in Brasília with national media coverage. These mixed messages concerning the severity of the pandemics were considered as a menace by the international community (The Lancet, 2020).

This was the first time that the Brazilian government has called on psychologists through “Brazil counts on me” (Brazilian Ministry of Health, 2020c). The Brazilian public health system hires psychologists to work in primary care in the Family Health Strategy (ESF) and in Family Health Support Centers (NASF), as mentioned above. However, until then, there was no work organized to serve the population at different levels of health care in biological disasters and aimed at the general population, patients, and healthworkers. Also, we did not have a tradition of online psychological care for health or training for psychologists in this field.

Brazilian psychologists have completely changed their professional activities, turning to online services. On March 26, the Federal Council of Psychology published a national resolution (Federal Council of Psychology, 2020a), reducing bureaucracy for psychologist’s registration for practice mediated by information and communication technologies. For instance, during COVID-19, psychologists can make use of information and communications technology to assist people during crises or



emergencies, which was forbidden before. Despite these changes, some limitations to online care were maintained so far, such as psychological assessment (Federal Council of Psychology, 2019), mainly concerning the use of some psychological tests, and, for some cases of forensic assessment, face-to-face service must be provided (Federal Council of Psychology, 2020b). The pandemic crisis has many potential sources of psychological distress (large-scale deaths, economic recession, unemployment, urban violence, lack of protective equipment, fear of contracting the virus, stigmatization). The provision of psychological services for mental health for the population, health professionals, and patients was a fundamental condition in this period (Torales et al., 2020).

Changes in regulation of telepsychology were crucial to the implementation of health policies, such as psychological care offering to the community, especially to health professionals. One of the first initiatives aimed at telepsychology to the population with mental suffering was a partnership between the Brazilian state of Rio Grande do Norte and the Federal University of Rio Grande do Norte.

Universities are providing teleservices [e.g., University of Juiz de Fora ([calmanessahora.com.br](http://calmanessahora.com.br)); State University of Londrina ([www.uelcontracoronavirus.com](http://www.uelcontracoronavirus.com))]. Federal University of Rio Grande do Sul associated with the Ministry of Health organized a call center to offer psychological support to health professionals involved in COVID-19 (<https://sites.google.com/hcpa.edu.br/telepsi/>), using an open platform for training and research. In the same way, Oswaldo Cruz Foundation of Brasília (Fiocruz), a research institution linked to Ministry of Health, produced a series of e-books about coronavirus (<https://www.fiocruzbrasil.fiocruz.br/coronavirus/saude-mental-em-tempos-de-coronavirus/>). From this material, an online course was created for several health professional categories, including psychologists. After completing this training, professionals will be allowed to use a telepsychology platform provided by Fiocruz.

COVID-19 associated with quarantine has produced changes in the psychological practices, bringing new challenges for professionals in Brazil. Researchers from the Brazilian Society of Psychology (BSP) have produced guidelines for psychologists (<https://www.sbponline.org.br/enfrentamento-covid19>) to guide evidence-based practice during the pandemic and a resource hub to provide links to different kinds of material related to psychological effects of COVID-19 produced by other scientific societies, researchers, and international health organizations.

## Russia

The COVID-19 pandemic has led to significant changes in the lives of Russians. To date, according to the official information (<https://xn--80aesfpebagmfb1c0a.xn--p1ai/>), more than 280,000 people are ill, 2,631 died. At least half of the cases detected in the capital of Russia, Moscow city, with a population of more than 12 million and over 17 million people live in the suburbs.

The self-isolation regime announced on March 30, 2020, during which, the majority of the population was compelled to stay at home, raised challenges that required a response from psychological science and practicing psychologists. Though, currently, in some regions, self-isolation regime is taken off in

Moscow, and in regions with detected high numbers of infected, it was prolonged until the end of May. During the last 15 years, Russian Psychological Society became deeply integrated with the education (elaboration of the educational standards for school- and university-level education). However, a lack of legislation on psychological help in the country due to the absence of specific regulations is probably the major challenge faced before and during pandemic, when the qualification of the service of volunteer psychologists became a relevant issue.

Rise in emotional reactions associated with the virus (fear of getting sick, anxiety for oneself and relatives, etc.), changing living and working conditions (cabin fever, violation of family structure, etc.), a situation of uncertainty about both the virus, and life at the end of the pandemic regime were detected.

## India

The first case of COVID-19 in the country was reported on January 30, 2020. This has increased to a total of 112,359 cases, 3,435 deaths in the country until May 21, 2020. So far, the majority of the cases had been reported in big cities, e.g., Mumbai, Ahmedabad, Chennai, Pune, Delhi, Jaipur. The COVID-19 outbreak was linked to people coming from outside the country initially, but, soon, it spread to many parts of the country. The Prime Minister of the country on March 22, 2020 asked the people to observe a Janta Curfew (voluntary public curfew), which found a massive support. This was a precursor to the forthcoming lockdown period. On March 24, 2020, a lockdown of the entire country was announced for 21 days, affecting the entire 1.3 billion population of India. On April 15, lockdown 2 was announced, extending the earlier lockdown until May 3, 2020, which was further extended to May 17, 2020 (lockdown 3). The Government decided to divide the country into three zones: Green Zone, Red Zone, and Orange Zone, having varying degrees of relaxations. We are now having another lockdown 4, until May 31, with more relaxations. During the lockdowns, various efforts were made by government agencies to make essential supplies available to people so that some of their hardships were taken care of.

The government launched a smartphone application called “Arogya Setu” to contain the spread of COVID-19 as well as to do contact tracing. The app intends to spread awareness of COVID-19 and to connect essential COVID-19-related health service to the people. The Ministry of Health and Family Welfare of India has created a separate section for behavioral health related to COVID-19 on its official website. The officials have actively been posting several audiovisuals, addressing the issues of social stigma related to COVID-19, stress management, depression, tobacco and alcohol consumption/addiction, practical tips on handling mental health during the lockdown, and taking care of the mental health of children as well as elderly. The Ministry early on undertook the role to create greater awareness of important issues, such as how to handle social isolation and has provided some practical tips to handle emotional problems, addressed “psychosocial issues among migrants during COVID-19,” among others. These efforts came as early as the last week of March, the week when the lockdown was announced for the first time in India. More and more resource material is actively being added to



the repertoire. A toll-free helpline number has also been issued, specifically to deal with psychosocial difficulties/issues (Ministry of Health Family Welfare Government of India, 2020).

A relatively young Ministry of AYUSH established in 2014 has also been playing an active role in the dissemination of information such as how to boost immunity and has provided simple ayurvedic procedures for cough and sore throat (Ministry of AYUSH, 2020). Ayurveda has for long played a central part in many people's beliefs and attitudes toward health issues in India. Positive informative messages from an official government ministry at a national level can help in boosting people's sense of security in these uncertain times.

The National Disaster Management Authority of Government of India on their home page created a subsection "COVID-19: Positive Stories" wherein various uplifting stories of generosity, positive developments in handling the COVID-19 virus, among others, are continuously published (National Disaster Management Authority, 2020a). Among the plethora of advisories from various ministries and departments of Government, the need to create social support and take care of the mental health of frontline workers was not forgotten (National Disaster Management Authority, 2020b).

However, government measures in dealing with mental health issues beyond providing resource materials and advisories are minimal. The fact that such issues have been acknowledged by the government is a positive step but still insufficient. The biggest concern in India is the well-being of the large section of the population, who are at the periphery. These include women, children, minority groups, other deprived groups based on caste and class as well as the physical and mentally challenged persons. Psychological associations face the biggest challenge to provide mental health services to this section. Several NGOs have also been very active. During COVID-19 times, these vulnerable groups have been worst impacted, challenging the unorganized psychological services in the country in many ways.

Using the Ministry of Health and Family Welfare's data source, NDMA created a list of COVID-19 warriors that total to 13,968,832. Among these are psychologists subsumed under allied and healthcare professionals at a paltry number of 532 and psychosocial care personnel that include M.Sc. psychology students and master of social welfare students with a total number of 1,163,46 (National Disaster Management Authority, 2020c). These figures do indicate that there is scope to further accept and strengthen the role of psychology in mental health services during these times.

## China

The CPS developed its Registry System for the Chinese clinical psychologists (RSCP) and set up criteria for qualification, continual education and training, and ethical standards (published in 2007, revised 2018) (Clinical Registration System of the Chinese Psychological Society, 2018). Soon after the COVID-19 breakout in early January of 2020, Chinese psychologists actively provided three levels of psychological assistance. At the first level, suggestions were provided to government agencies to take necessary actions to prevent public panic and promote psychological relief from the beginning of

the blockage. The psychological intervention has been integrated in the national emergency administration from the early stage. On January 26, China CDC issued the guideline of emergency psychological crisis intervention during the coronavirus outbreak. On 5th March, National Health Commission and the Ministry of Civil Affairs jointly issued a guideline to call for psychological assistance and social services for patients of the COVID-19, quarantined persons and frontline workers in epidemic prevention and control (Zhengkui et al., 2020).

Health administration and civil affairs departments in severely affected regions should organize professional teams to provide online and offline psychological assistance for frontline medical workers and disease-control personnel, as well as those who stick to their posts, including traffic police, logistics, and community workers, according to the guideline. On March 18, the State Council interagency task force issued "psychological counseling for those affected by COVID-19 (Jia et al., 2021), which called for sustained psychological counseling services, especially for COVID-19 patients, their families, families of fallen patients, vulnerable groups, health workers and those fighting the virus in the front line, including police officers and community workers. The psychological services (including lectures for general populations, individual counseling, and online self-helping programs-APPs) are mainly provided remotely via the internet or mobile phones (Li et al., 2021). Two weeks after the quarantine of Wuhan, the epidemic center of the COVID-19 breakout, on February 7, the National Health Commission released the guideline for psychological intervention hotlines during COVID-19, guiding the hotlines' setup, counselor training, and supervision. The guideline also addressed the importance of ethics in the distance counseling. Psychologists (especially those in the CPS Division of Clinical Psychology) have been working closely with governmental officials and psychiatrists and social workers at different levels. It is necessary to incorporate psychological support into the planning and construction of social governance and social psychological service system. Mental health of common civilians and the needs of a stable and harmonious society continue to drive the development of psychology in China.

From the nature of different subjects and a country's requirements of social psychological service system, group-oriented and individual-oriented social psychology are inevitably apart in many aspects, as service recipients, service concepts and ideas, service implementation, etc. It is recommended to build the social psychological service and social governance system based on social psychology, instead of only from the perspective of individual psychological health.

Traditional Chinese culture emphasizes more on group rather than individual. It is easier for group-oriented social psychology to study and design the construction of the social governance and social psychological service system from a macro level. Praise to the Traditional Chinese Medicine, together with the western medicine, the COVID-19 pandemic had been actually contained in Wuhan (and all around China) in late March 2020. However, the home quarantine policy had been strictly, whenever required. Psychological supports have been provided systematically throughout China at the community level, with

focuses on arch hospitals and schools/universities, mainly via online services.

All the above highlight and reinforce the importance of group-oriented social psychology in the construction of social governance and social psychology service system.

## South Africa

As of May 23, 2020, the total number of people infected with COVID-19 was 21,343. This survey is updated regularly on the South African government website that was launched specifically to communicate information about the pandemic [see SA Coronavirus (n.d.)].

On March 15, 2020, the South African Minister of Cooperative Government and Traditional Affairs declared a National State of Disaster in terms of the Disaster Management Act Number 57 of 2002. Through the National Disaster Management Center, which is provided for in the Act, the government is required to “promote an integrated and coordinated system of disaster management, with special emphasis on prevention and mitigation by national, provincial, and municipal organs of state, statutory functionaries, (and) other role players involved in disaster management and communities” (Department of Cooperative Governance and Traditional Affairs, 2002).

Informed by this Act, the South African national government has welcomed the involvement of individuals and professional groups that have offered to assist the government in its response to COVID-19. Consequently, psychologists in South Africa have individually and collectively come forward and are now involved in efforts spearheaded by the government to contain the pandemic. For instance, the Psychological Society of South Africa is one of the organizations that have formed what is known as “HealthCare Workers Care Network (HWCN),” an organization made up of psychologists, psychiatrists, anesthesiologists, medical doctors, and other health professionals. This multi-stakeholder initiative aims to support health care workers during the COVID-19 pandemic and beyond (Psychological Society of South Africa, 2020). Currently, this organization provides training, webinars, and psychoeducational information for healthcare workers. It also uses volunteers to offer individual and group support to healthcare workers. All mental health initiatives that are influenced by the Disaster Management Act are likely to have important psychosocial benefits for vulnerable groups, such as homeless people, the elderly, children, and those exposed to violence, drugs, and substance abuse.

At the beginning of May 2020, the country transitioned into Level 4 of the five-stage risk-adjusted response, with Level 3 due to start on June 1, 2020. As shown in **Table 1**, Level 4 provides for extreme precautions to limit community transmission and outbreaks, while allowing some activity to resume. Some of the activities that were allowed during this level were limited wholesale, retail, manufacturing, and agricultural and health activities. While less severe, Level 3 will still impose restrictions on work and social activities to address the high risk of transmission. Some high-density settlements will be declared hotspots during Level 3. A hotspot is defined as “... an area that has more than five infected people per 100,000 people or

where the new infections are increasing at a fast pace” (President Ramaphosa speech, May 24, 2020).

Due to the restrictions imposed on individuals during the pandemic, the Health Professions Council of South Africa (HPCSA) had to revise its guidelines on the provision of online health services. In its original General Ethical Guidelines for Good Practice in Telemedicine, the HPCSA discouraged health practitioners from routinely servicing their patients virtually (Health Professions Council of South Africa, 2020). In a recent notice issued on March 26, 2020, in response to COVID-19, the HPCSA pronounced that “telehealth is only permissible in circumstances where there is an already established practitioner-patient relationship, except where telepsychology and/or telepsychiatry is involved; in which case, telehealth is permissible even without an established practitioner-patient relationship” ([https://www.hpcs.co.za/Uploads/Professional\\_Practice/FAQ\\_Professional\\_Practice.pdf](https://www.hpcs.co.za/Uploads/Professional_Practice/FAQ_Professional_Practice.pdf)). This new development provides an opportunity for psychologists to explore new avenues for providing mental health services for their clients, now and possibly, in the future. As a result of this reform, many telehealth platforms are now inviting health professionals to attend webinars that offer some form of training on how to provide telehealth services, including a teletherapy and counseling (for example, see [www.ezmed.solutions](http://www.ezmed.solutions) and [www.cgm.com/za](http://www.cgm.com/za)). The medical insurance companies have also come out in support of telehealth services by assuring psychologists and other health professionals that they will reimburse the service providers for this alternative service [for example, see *Discovery Health* (n.d.)].

It is important to register that 26 years after the demise of a colonial government that guaranteed more privileges for a minority community of European descent when compared with indigenous African communities, the majority of South Africans continue to have little or no access to mental health services. One of the key focus areas of the Psychological Society of South Africa before COVID-19 has been to actively strive for social justice by opposing policies and practices that deny individuals or groups access to mental health services.

## Social Roles of Psychology Brazil

The COVID-19 pandemic has exacerbated social inequalities (Dorn et al., 2020) in different countries, and Brazil is no exception. Considering that one-third of households do not have adequate sewage collection, 15.1% do not have running water (Brazilian Institute of Geography and Statistics, 2018) and the high number of homeless people and prisoners who cannot be in social isolation, basic preventive care is not available to everyone. Besides hampering basic care, inequality *per se* tends to intensify during the pandemic. Prejudice (Bavel et al., 2020) and domestic violence (Marques et al., 2020) are expected, among other implications. In this sense, psychologists should be able to offer psychosocial support to those facing inequalities during this period. CRP and its regional councils advised psychologists on the importance of psychosocial support for different vulnerable groups, such as homeless people (Regional Council of Psychology-São Paulo, 2020) and prisoners (Regional Council of Psychology-Bahia, 2020; Regional Council

**TABLE 1** | Summary of alert levels in South Africa [adapted from SA Coronavirus (n.d.)].

Alert level	Level 5	Level 4	Level 3	Level 2	Level 1
Objectives	Drastic measures to contain the spread of the virus and save lives	Extreme precautions to limit community transmission and outbreaks, while allowing some activity to resume	Restrictions on many activities, including at workplaces and socially, to address a high risk of transmission	Physical distancing and restrictions on leisure and social activities to prevent a resurgence of the virus	Most normal activity can resume, with precautions and guidelines followed at all times. Population prepared for an increase in alert levels if necessary

of Psychology-São Paulo, 2020). Moreover, scientific societies, universities, and different groups of psychologists have mobilized to deal with other social problems, such as prejudice, domestic violence, and fake news.

### Prejudice

Prejudice is a hostile attitude toward groups or individuals for being part of certain groups (Allport, 1954). During the pandemic, hostility toward Chinese has grown, even promoted by some Brazilian politicians (Globo, 2020). There are also reports of health professionals being stigmatized (Markman, 2020). Seeking to reduce the occurrence of prejudice and discrimination, the Brazilian Psychological Society prepared a document with guidelines for facing stigma and prejudice during the pandemic (Peucker and Modesto, 2020).

### Domestic Violence

Domestic violence has been one of the consequences of social distancing (Chandan et al., 2020). In Brazil, it is estimated that, in March (when social distancing measures were announced in the country), the increase in domestic violence was 17% (Marques et al., 2020). Seeking to reduce the problem, scientific societies and groups of researchers have sought to inform psychologists and the general population about the different types of domestic violence (Curia et al., 2020), conflict mediation strategies in the family (Soares and Modesto, 2020), as well as channels to Brazilian institutions that offer psychosocial support (Mello and Modesto, 2020).

### Fake News

Besides social inequality, the spread of fake news in social media became another problem for public health in Brazil (Thomas et al., 2018; Waszak et al., 2018). Also, the Brazilian president took a stand against social isolation and minimized its consequences, which has been a problem for the country, according to an editorial in *The Lancet* (2020). Brazilian researchers analyzed the influence of fake news on prevention behaviors during the pandemic and found out that belief in fake news was associated with less social distancing (Modesto et al., submitted)<sup>1</sup>, although political polarization has a more robust effect than fake news (Modesto et al., 2020). Many scientific societies in Brazil have shared WHO, PAHO recommendations, as well as producing accurate material that aims to confront fake news.

<sup>1</sup>Modesto, J. G., Keller, V. N., Rodrigues, C. M. L., and Lopes, J. L. S. (2020). The moderating role of belief in a just world on the association between belief in fake news and prevention behaviors during the Covid-19 pandemic (Manuscript submitted).

### Russia

While organizing psychological assistance in the usual ways (in person) is not possible, the possibilities of online counseling are widely used. The Russian Psychological Society, the Russian Academy of Education, Faculty of Psychology, Lomonosov Moscow State University organized several hotlines for psychological assistance [including a united 24/7 hotline on the website of COVID-19, organized by the Russian Government (<https://xn--80aesfpebagmfb0a.xn--p1ai/>)]. In total, more than 1,000 psychologists participate in the work of hotlines of federal and regional significance.

### India

The role of psychology is immense in these circumstances. Several psychologists, as well as NGOs involved in elderly care, homeless people, and vulnerable sections of the population, are actively participating in providing relief and mental health services. Psychology associations are playing an active role as well as psychologists and healthcare professionals associated with medical institutions. For instance, a relatively new Association of Health Psychologists (AHP) took an active initiative in extending its services during the time of COVID-19. It was the first professional organization to launch online counseling in the first week of April 2020 for anyone directly or indirectly affected by COVID-19 or the lockdown-related psychological issues. The first initiative was in Hyderabad under the banner of “SERV,” an acronym for “Social Emotional Rehabilitation of Virus Victims.” This was launched in collaboration with UNICEF, Action Aid, Dr. Reddy Foundation-School Improvement Programme, APTS Social Service Forum, and Asha Hospital. Counselors with the highest academic background and years of experience are available on a helpline 24 × 7. Encouraged by the response, the AHP started similar helplines in collaboration with Sri Padmavathy Mahila University Thirupathy, Andhra Pradesh, Orissa Central University, Koraput, Odisha, Calcutta University, West Bengal and Bangalore, Karnataka in collaboration with UNICEF. The counselors attended thousands of calls from different parts of the country as well as a few calls from Indians residing in other countries. In initial months, the calls related to general anxiety of the “fear of unknown”; insomnia; interpersonal conflicts due to home confinement leading to a situation called “home crowding”; the anxiety of frontline health care workers; the psychological distress of people in quarantine centers; panic attacks of people of all ages, gender, and geographical location; anxiety of students due to uncertainty of examination schedule; financial problems; non-availability/accessibility of regular medicines due to lockdown; precipitation of pre-existing



mental health problems; issues related to migrant labor; and also calls from victims of domestic violence, to name a few. Apart from COVID-19/Lockdown-related problems, the helpline has been receiving calls related to other psychosocial problems. Because of this, the helplines are continuing through, and the number of COVID-19-related calls has been gradually reducing.

Several initiatives were taken by other associations as well (which will be discussed in a later section); however, looking at the population of the country, the problems are immense and can be tackled only with the combined efforts of all. More and more psychologists should be involved by the government in these times as in when there is a second wave of COVID-19 later in the year, mental health concerns are going to become pivotal. Many people have lost their jobs, and as time passes and they do not get economic relief, mental health concerns are going to become acute. It is not to say that mental health concerns are not important now. The concerns because of lockdown are related to fear, anxiety, social isolation, lack of human stimulation, working from home, and making the fine balance between home and work. Once the lockdown is lifted, as no society can be in a state of complete lockdown, the fear is related to a surge in cases of corona infections, disease, death; all of which may lead to serious mental health concerns. Psychology associations should make the government start focusing more on mental health issues of the most vulnerable sections of the society.

### **Fake News**

News items and images not related to COVID-19 times were shared and created fear and panic among citizens. The government is tackling the problem of fake news by requesting social media platforms to remove and not promote messages that will weaken the government's efforts during these times. The media is continuously being requested to play a very responsible role and help in countering fake news. Some news channels are doing a commendable job of alerting people to fake news. In these times, responsible sharing of news has to be followed, but, as is the current situation, fake news is rampant. Irresponsible forwarding of messages on social media should be avoided. The Government of India has recently issued a directive, asking social media companies to voluntarily curb fake news and misinformation related to the coronavirus on their platforms. This is considered as an important step to prevent the community transmission of the disease. A lot of psychology research shows that, in times with a lot of uncertainty, rumors and propaganda of various kinds have easy acceptability among the masses. Stern and prompt actions are needed; otherwise, it will play havoc with people's life and health. Together with the government, it is also important that we, citizens, not only exercise caution but debunk such messages.

## **Socioeconomic Context**

### **Brazil**

About 13 million Brazilians live in favelas. Hygiene recommendations are near impossible to follow in these environments because of the high demographic density and lack of treated water. Communities in favelas have organized themselves to implement measures on their own (The Lancet,

2020). The prevalence of deaths and contamination by Sars-Cov-2, inconsistent government measures of social isolation, quarantine and lockdown, and their long-term impact will widen such existing socioeconomic disparities. Therefore, the impact of COVID-19 on mental health is also greater in economically disadvantaged populations (Frasquilho et al., 2016; Mental Health Foundation, 2020; Nações Unidas Brasil, 2020). The universal income program Bolsa Família was established in 2003, and today, it serves 13.1 million families (40.8 million people), who receive an average benefit of R\$ 188.86 per month. In the crisis caused by COVID-19, an emergency aid (R\$600, equivalent to U\$100, for 3 months) was made available to informal workers, individual micro-entrepreneurs, self-employed, and the unemployed; 60 million citizens requested it (<https://www.gov.br/pt-br/servicos/solicitar-auxilio-emergencial-de-r-600-covid-19>).

Brazil has a large informal employment sector, with many sources of income no longer an option (The Lancet, 2020). Considering the economic impact of the pandemic in Brazil, a survey carried out by the National Confederation of Industry (CNI) in May 2020, with 2,005 people over the age of 16, in 27 states, found out that Brazilians lost their purchasing power; 23% of respondents lost their income, and 17% had losses in their monthly income, which represent almost 40%. The fear of losing a job was reported by almost 80% of the respondents, and 9 out of 10 people rated the impact of COVID-19 on the Brazilian economy as significant. According to the data, 40% of the respondents reported having overdue accounts in the last 40 days (Agência Brasil, 2020).

With around 55% of the entire global population without access to social protection, these losses will harm many sectors, such as education, human rights, and in the most critical cases, basic food security and nutrition. Hospitals with limited resources (i.e., lack of personal protective equipment for health professionals), deficient health systems are expected to collapse. This could worsen with a peak in the number of cases since up to 75% of the population in the least developed countries do not have access to hygienic supplies. Other social conditions, such as precarious urban planning and overpopulation, deficient waste management services, and even traffic jams that prevent access to health care, can contribute to drastic growth in the number of cases of COVID-19 (Nações Unidas Brasil, 2020). In this context, it is crucial to take into account the broad socioeconomic consequences of pandemic crisis, which will have serious impacts on mental health by increased rates of unemployment, financial insecurity, and poverty (Barr et al., 2015; Holmes et al., 2020).

Many private companies have decided to help various segments of society, with hygiene items, food, clothing, and water donations, supported by the tax incentive laws. One example of organized action of the private sector is Todos pela Saúde (<https://www.todospelasaude.org>).

COVID-19 initially reached large urban centers in Brazil, concentrated in the industrialized state of São Paulo. However, it has advanced rapidly across the country, hitting badly the states of Amazonas and Pará and extending to indigenous territories in the Amazon. Amazonas is the Brazilian state with the largest number of indigenous people. According to the IBGE, the state has 183,514 indigenous people; of which, 70% live



in villages. Many communities are lacking basic hygiene items (soap, treated water) to reduce the risk of contagion. People also live in villages and share utensils, which increases the chance of contamination. Indigenous communities also live in areas where there is limited access to healthcare, particularly intensive care beds (BBC News, 2020). Federal government has been ignoring or even encouraging illegal mining and logging in the Amazon rainforest, and, now, these loggers and miners risk bringing COVID-19 to remote populations (The Lancet, 2020). As contingent action, the Federal Government sent financial aid to the State of Amazonas. By the end of May 2020 will be inauguration of the first health area dedicated to the care of indigenous patients with COVID-19 in the State of Amazonas. It will have 53 beds, 33 clinical beds, 10 Intensive Care Units (ICU), and five Intermediate Care Units (ICU). There will also a space for spiritualization destined to shamans—spiritual leaders of indigenous peoples (Ministério da Saúde do Brasil, 2020).

### India

One of the major social problems that have been highlighted during COVID-19 times is the sharp divide between the haves and the have-nots, the rural and the urban, and the privileged and the vulnerable sections of the society. This divide was already there but got highlighted during this time. Visuals on television of thousands of migrants fleeing from major cities to their villages are very disturbing. With factories and workplaces shut down, many migrant workers were left with no food, money, and shelter. There was thus a mass exodus from big cities. Because of the lockdown, this was a major issue. The government has been arranging relief camps for these people, announced an economic package for them and requested companies/employers to pay the workers their salary during the lockdown period. Unemployment has risen and lots of migrant workers had no choice but to return to their homes. There are some apprehensions associated with this exodus to the rural areas. As a large number of migrant laborers are returning from big cities which are the hot spots for COVID-19, the fear of the pandemic in rural areas is frightening as health infrastructure is insufficient in these areas. The lived realities of the past few months were tumultuous and catastrophic for most migrant workers, especially women, and, unfortunately, mental health, and psychological services available to them are at the bare minimum, except those provided by some NGOs. What is of utmost importance in the Indian scenario is to compile data related to psychological services and psychology professionals, as, at present, in the absence of such documentation, it becomes difficult to comment on the role of the psychological associations during this pandemic.

### South Africa

The South African government imposed a national lockdown that lasted for 6 weeks, starting on March 26, 2020. In his address to the nation, President Cyril Ramaphosa pointed out that the national lockdown is one of the five alert levels of the South African government's risk strategy to respond to the spread of COVID-19. As reflected in **Table 1**, alert Level 5 of the national lockdown was the most stringent measure that entailed the closure of schools, businesses, and recreational facilities,

except essential services. This alert level had a significant negative impact on the health, social, and economic lives of individuals and communities. For instance, a national survey by the Human Sciences Research Council (HSRC) found out that between 45 and 63% of those surveyed reported that the lockdown would make it difficult to pay bills, debts, earn income, feed their families, and keep their jobs (Human Sciences Research Council, 2020). The restrictions on people's movements also meant that some patients who needed to receive medical and psychosocial services could not access these, as public transport was not readily available.

The national government put in place some socioeconomic measures that were aimed at individuals, families, and businesses to mitigate against negative impact of COVID-19. At individual and family levels, the interventions introduced included payment of a social relief grant, a distress grant to the unemployed, and an increase in the social grant amount paid to the indigent, among others. For businesses, the government introduced tax relief, economic stimulus measures, and employment-related measures, such as the employment tax incentive that encourages employers to hire young unemployed job seekers. While these measures have assisted greatly in minimizing the negative impact of the pandemic, there have been several challenges associated with these government initiatives. These include a lack of capacity on the part of national and local governments to roll out so many socioeconomic measures in a short space of time.

## Actions of Psychology for the General Population and Health Professionals During Stage 1 of the Pandemic Brazil

The Conselho Federal de Psicologia, the regulatory agency or professional psychology, registered psychologists for online practice and provided basic professional guidelines for work during COVID-19 (e.g., to provide services in ventilated places, allowing a distance of 1 to 2 m between people). If a professional chooses to provide online psychological services, he or she must follow previous guidelines (CFP Resolution No. 11/2018) and register to do so in the respective Regional Psychology Council.

The Brazilian Society of Psychology (BPS) constituted a Working Group of professional researchers who sought to base their actions on developing strategies for training and supporting this professional category in coping with the situation of COVID-19. The work was developed using scientific and technical criteria, using evidence to support their decisions and guidelines. The first step was to publish fascicles, available free online at the SBP homepage (<https://www.sbponline.org.br>). Moreover, links with relevant information about the pandemic from reliable sources were also made available by SBP.

So far, 10 topics have been developed with updated information to contribute to the professional practice of psychology. The texts are brief and objective and seek to help understand the context, identify the concepts involved, learn about alternatives, and monitor interventions. The first edition addresses the technical guidelines for the work of psychologists in the context of the COVID-19 crisis and contextualizes the

pandemic and provides guidelines for psychologists to work with health professionals. The second topic entitled “Stress in Health Professionals Who Care for Patients with COVID-19,” defines stress and presents clinical examples of professionals who work with patients with COVID-19. It identifies its possible manifestations, individual and institutional management, as well as the monitoring of the interventions performed. In the third topic, the three Ds are addressed: despair, helplessness, and hopelessness in health professionals. Key D concepts, individual reactions, and examples of verbalizations of fear, despair, helplessness, hopelessness, and suicidal ideation are defined. They present factors that determine the way people face a crisis (previous experience of crisis, support system, and history of mental disorders) and the first psychological aids: welcoming and active listening, psychoeducation, helplessness approach, focuses on despair, coping fear, focus on hope, problem-solving, assessment of ideation, and suicide risk. The fourth topic deals with the stigmatization of health professionals. It contextualizes the problem, defines stigma (internal and external), and provides management strategies, such as access to information, awareness, and ethical posture. In the fifth topic, recommendations are presented for the on-line and online professional practice of psychology in the face of the COVID-19 pandemic. It addresses the alternatives on how to offer the first psychological help to health professionals working in hospitals. It guides through how to proceed with online, voluntary, in-person, and hospital care. The sixth topic deals with mourning and reviews the concept, demonstrating the physical and emotional reactions experienced in this process and the alternatives for the psychologists to address this theme. In the seventh topic, issues related to the management of conflicts in the family are presented. It discusses how isolation predisposes to the appearance of conflicts and presents strategies for handling the situation, with steps for resolving conflicts. The eighth topic discusses the management of sleep disorders in the context of coping with COVID-19. It demonstrates how the pandemic can predispose to sleep disorders and identifies management strategies. The ninth topic presents the theme of psychological support for parents of children from 0 to 11 years old during the COVID-19 pandemic. It seeks to provide support for the psychologists to work with parents and provides behavioral management strategies during isolation. The 10th topic addresses issues related to violence against women. The different forms, phases, and consequences of this type of violence are defined. Alternative actions are presented, as well as techniques and devices that are usually used in the situation.

The TelePSI Project (<https://sites.google.com/hcpa.edu.br/telepsi/>) is an initiative of the Ministry of Health of the Brazilian Government, in partnership with the Hospital de Clínicas de Porto Alegre, which received the support of several academic institutions and societies, including the Brazilian Society for Psychology. In TelePSI, contracted psychologists and psychiatrists offer psychological and psychiatric consultations to manage stress, anxiety, depression, and irritability in health professionals and students, teachers of all levels of education, and professionals of essential services. They receive specific

online training and supervision, and data are collected to compare the effectiveness of different interventions are clinical and scientific supervision group for evaluating different types of psychotherapy for emotional problems during the pandemic, and disseminating psychoeducational materials. Oswaldo Cruz Foundation of Brasília (Fiocruz) planned a similar teleservice provided by trained volunteer psychologists.

## Russia

### *Psychoeducation*

Psychologists have been actively involved in informing the public about how to organize their lives in conditions of self-isolation with children, the elderly, alone, etc. RPS has elaborated recommendations for various groups of the population on organizing the activities during the period of isolation (<http://xn--n1abc.xn--p1ai/news/themes/8462/>), as well as their promotion through Federal and regional media regularly. During 2 months, representatives of the Russian Psychological Society made more than 150 interviews to the media and more than 30 interviews on Federal and Regional TV channels in the frame of talk shows, expert talks, etc., making recommendations for the public concerning the organization of the daily routine, coping with anxiety and stress, organizing activities for children, and exposing relevant fake news.

Starting from March 16, 2020 students of all higher educational institutions in Russia were urgently transferred to distance learning, which created a lot of organizational and psychological difficulties and became a source of stress for all the participants of the educational process. This shift toward distant learning was successful due to such well-established platforms as [distant.msu.ru](http://distant.msu.ru), [webinar.ru](http://webinar.ru), etc.

Due to anonymity, online education at the university led to cases of cyberbullying, cybertrouling, spamming, which became the reason for the development by the RPS of recommendations addressed to university teachers on how to behave properly in such situations to protect themselves and students from cyber interference.

A separate task for psychologists in the field of education was maintaining the motivation of students who were torn out of the usual educational context. The recommendations developed by the RPS allowed teachers to support the students' engagement in distance learning situations. At the same time, the psychological services of the universities monitor the psychological state of teachers who find themselves in a situation of increased stress.

No less challenging was the situation and the organization of the distant educational process at schools and preschools. The transition to distance learning became possible, thanks to the previously introduced Russian Electronic School (<https://resh.edu.ru/>), Moscow Electronic School (<http://mes.mosedu.ru/present-en/>), which is an official all-Russian resource for schooling as well as other resources, such as Yandex.Uchebniki (<https://education.yandex.ru/home/>), «Advance», «iSpring», «InternetUrok.ru», «Unicraft», etc. The actual collision of the norms of family life and the norms of the school in the situation of the distant organization of the educational process led to conflicts between teachers and parents, and increased stress. RPS has developed relevant

recommendations for both teachers and parents to optimize the organization of the educational process and normalize relations between family and school.

### **Work With Medical Staff**

In April 2020, psychologists faced the challenge of implementing psychological assistance for medical personnel experiencing a high workload and stress. Representatives of the Russian Psychological Society provided methodological assistance in the systemic psychological support of management, medical personnel, patients, and their relatives in medical institutions for patients with COVID-19. Telepsychology was organized both for medical personnel and for patients and their relatives. However, in special cases, offline work was organized.

Leading specialists of the Faculty of Psychology of the Lomonosov Moscow State University, the Russian Academy of Education, and the Russian Psychological Society, together with the Federal Medical Biological Agency of Russia, and, personally, its head, Veronika Skvortsova, had developed “psychological thermometers” for adult patients and patient-children and medical staff who provide medical care for patients with COVID-19 ([http://fmbaros.ru/psikhologicheskaya-podderzhka/detail/?ELEMENT\\_ID=38750](http://fmbaros.ru/psikhologicheskaya-podderzhka/detail/?ELEMENT_ID=38750)).

With the help of such “psychological thermometers,” one can independently measure emotional state in an online format and get instant feedback on self-help measures, the required support from colleagues, and, also, the need to seek professional psychological help in the respected psychological service of the hospital or medical center where the person is working or receives treatment.

## **India**

As already mentioned earlier, the major psychology associations are making significant contributions furthering the role of psychology as a science and profession in the country. We have three major associations: National Academy of Psychology, India (NAOP, India), which represents India in the IUPsyS; the Indian Association of Clinical Psychology (ICAP); and Indian Academy of Applied Psychology (IAAP). As discussed by Manickam (2016), together these three associations may have a membership of over 4,000 psychologists, which, certainly, do not match the vast requirements of the country. The Indian Association of Clinical Psychology has been making pioneer contributions during COVID-19 times. Indian Association of Clinical Psychology (IACP) has taken an initiative to form a “COVID-19 Psychological Support Group.” This initiative is providing free telephonic/online counseling for people in emotional distress. As a part of this program, they are training volunteers so that they can help in providing psychosocial support for the callers. The association is also providing psychoeducational tips for parents/caregivers of person with disabilities. Modules on how to handle emotional and behavioral problems, behavioral management, and coping with COVID-19-related stress are also being provided for the general public. The association is also providing various kinds of psychological support for migrant workers who are facing difficult times as well as frontline workers (doctors, nurses, police personnel,

etc.), who are working hard under difficult circumstances to provide health care. The Indian Academy of Applied Psychology (IAAP) has been providing online support, educating people with authentic information about COVID-19, extending help, counseling, and giving appropriate referral services to manage stress. In addition, the association is organizing special events like essay competitions and other activities related to the psychological impact of COVID-19 to increase awareness about the disease. The National Academy of Psychology (NAOP, India) has been extending support by disseminating information related to prevention and protection through webinars on issues related to pandemic and vulnerability during these times. Online support is also being provided through counseling. Besides these major associations of the country, a large number of NGOs and other associations are also contributing significantly in terms of providing mental health services, training the counselors to provide help for those who are in desperate need of assistance.

India’s experiences in the pandemic of COVID-19 have shown that a better public health system with special programs based on various sections of the society is needed (Kumar et al., 2020). Though it started as a disease in urban areas, the fear of the disease spreading to rural areas is a big one. In a country like India, where 65–68% of the population live in rural areas and these areas already have the highest overall burden of disease and accompanied lack of health facilities, it is a major risk factor. As Kumar et al. (2020) argue there is the need to take immediate steps to control the spread and its aftereffects and to use this opportunity to strengthen and improve its primary health care system in rural India. The health care system is not adequate or prepared to contain COVID-19 transmission in the rural areas because of the shortage of doctors, hospital beds, and equipment, especially in densely populated states (Mitra, 2020).

As Nayar et al. (2020) posit, it is important to understand the forms of emotional disturbances among the different age groups as well as different sections of the society. A new form of “othering” is seen in society. Who is the other is being redefined. The same colleague, domestic help, and neighbor are now seen as the other due to the suspicion that they may be potential carriers of infection. There is a kind of dichotomized world view that is prevalent (Nayar et al., 2020), which has altered the fabric of the society where everyone is fearful of getting infected, despite the “not me” syndrome. Additionally, scores of people have lost their sources of income. For most people, priorities in life are changing, putting an additional burden of stress.

## **China**

The Clinical Psychology Registration Work Committee of the Chinese Psychological Society (hereafter referred to as the “Registration System”), as a self-regulated professional organization of clinical and counseling psychology, devoted itself to the psychological aid after the outbreak of the COVID-19 pandemic and explored effective approaches and methods for psychological aid!

1. Speak up as professionals. The Registration Work Committee started to work on January 23 and issued a written proposal to all the psychological professionals across the nation on January 26, and advocated that all the psychological aid should

be integrated in the national framework in fighting the COVID-19, and underlined the need of multi-department cooperation. It reaffirmed the professional ethics and strongly emphasized that all the psychological aid should be conducted scientific orderly and conform to professional standards.

2. Set up an organizational structure. The Registration Work Committee set up the organizational structure on January 25 and established several working groups with different functions to ensure orderly development, including the supervision group, the popular science dissemination, the information resource acquisition, and so on.

3. Give full play to the superiority of the Registration System members. A group of 161 registered clinical psychology supervisors, who were willing to supervise, was released to the public on the WeChat Official Account, providing free supervisory resources for counselors, and psychotherapists.

4. Enhance the competencies in psychological aid. The sudden outbreak of the COVID-19 emerged in a fast spread and affected widely, and as a result, most psychological aids were conducted through hotlines, including the popularization of the medical knowledge of the COVID-19. The Registration Working Committee decided to work in a pyramid model due to the specialties of the COVID-19, referring to training registered psychology supervisors and providing guidelines and approaches for them to supervise counselors and therapists who work in the front line. From January 28 to May 20, a total of 32 training sessions and supervision have been arranged for registered supervisors with a total of more than 1,600 participants. Nearly 10 million people received training and supervision focused on hotlines, psychological stress, and crisis intervention provided by the trained supervisors.

5. Timely release professional guidance documents as a leading professional organization. Guidelines for Psychological Aid Hotline under the Contagion Fight, Guidelines for Online Psychological Aid under the Contagion Fight, Ethics for Psychological Hotline (First Draft), and Ethics for Online Counseling (First Draft) were released continuously from January 31, leading professionals to conduct within competencies and comply with the ethics.

6. Cooperate with governmental officials and peer colleagues from other professionals (social workers, psychiatrists, etc.). To cooperate with the National Health Commission, the competent government department for psychological aid during the COVID-19 pandemic. The Registration Work Committee put forward targeted psychological aid policies for the country and the specific population affected by the epidemic, for e.g., timely proposing the overall plan of psychological aid construction for the Arch hospitals built in Wuhan. Besides, it joins hands with other academic organizations, such as the Chinese Association for Mental Health, China Association of Social Psychology, in fighting against the COVID-19 pandemic to share resources and joint proposals.

7. Promote the popular science on the major media. Make knowledge dissemination of audio or videos programs on how to promote mental health in the pandemic period and provide the public with knowledge and methods on mental health to adjust the mentality and be positive and optimistic.

## South Africa

At the beginning of May 2020, the country transitioned into Level 4 of the five-stage risk-adjusted response, with Level 3 due to start on June 1, 2020. As shown in **Table 1**, Level 4 provides for extreme precautions to limit community transmission and outbreaks, while allowing some activity to resume. Some of the activities that were allowed during this level were limited wholesale, retail, manufacturing, and agricultural and health activities. While less severe, Level 3 will still impose restrictions on work and social activities to address the high risk of transmission. Some high-density settlements will be declared hotspots during Level 3. A hotspot is defined as “... *an area that has more than 5 infected people per 100,000 people or where the new infections are increasing at a fast pace*” (SA Coronavirus, n.d.).

Due to the restrictions imposed on individuals during the pandemic, the Health Professions Council of South Africa (HPCSA) had to revise its guidelines on the provision of online health services. In its original General Ethical Guidelines for Good Practice in Telemedicine, the HPCSA discouraged health practitioners from routinely servicing their patients virtually (Health Professions Council of South Africa, 2014). In a recent notice issued on March 26, 2020, in response to COVID-19, the HPCSA pronounced that “telehealth is only permissible in circumstances where there is an already established practitioner-patient relationship, except where telepsychology and/or telepsychiatry is involved; in which case, telehealth is permissible even without an established practitioner-patient relationship” (Health Professions Council of South Africa, 2020). This new development provides an opportunity for psychologists to explore new avenues for providing mental health services for their clients now and, possibly, in the future. As a result of this reform, some telehealth platforms are now inviting health professionals to attend webinars that offer some form of training on how to provide telehealth services, including teletherapy and counseling (for example, see [www.ezmed.solutions](http://www.ezmed.solutions) and [www.cgm.com/za](http://www.cgm.com/za)). The medical insurance companies have also come out in support of telehealth services by assuring psychologists and other health professionals that they will reimburse the service providers for this alternative service [for e.g., see Discovery Health (n.d.) and GEMS (n.d.)].

## Possible Actions in Stage 2

### Brazil

There is a COVID-19 Clinical Care Protocol for Primary Care, which does not provide psychological care for these patients (Brazilian Ministry of Health, 2020a), despite the number of psychologists in SUS. Currently, psychologists working in primary care (UBSs) interrupted their routine care (e.g., guidance groups) and performed only welcoming, referring patients who required mental health care to the Psychosocial Care Centers (CAPS) (Brazilian Ministry of Health, 2020b).

CAPS also changed their routine during the pandemic. There is a dispensation of psychiatric medication with a longer term (e.g., for 3 or 6 months, depending on the characteristics of the patients), constant monitoring (weekly or fortnightly) by



the technicians (e.g., psychologists), weekly individual attendance for severe cases only (with personal protective equipment) (only one patient and one companion at a time) or home care, after screening for COVID-19 symptoms.

Health institutions (e.g., hospitals) started to provide psychological care for families of inpatients or those who died as a result of COVID-19 and health professionals who care for these patients. Networks were organized to provide psychological assistance for health professionals by universities, associations, and groups of psychologists. Besides, starting in May 2020, online psychological care by SUS is foreseen for health professionals (FIOCRUZ, 2020), which is already happening in some teaching hospitals in the country.

It is expected that, in the second phase of the pandemic, Brazilian Society for Psychology and other scientific societies will continue to support the work of psychologists facing the new challenges. The aim is to improve professional skills and competencies, providing training and supporting the development of technologies and service protocols. Moreover, the scientific production in psychology in the context of COVID-19 must reach the professional psychologists and benefit the population. Communication about the professionals' practice and increased accessibility to psychological services through psychoeducation and telepsychology should be sought.

### Russia

Representatives of RPS, as well as researchers all over the world, are actively engaged in monitoring the mental conditions of various population groups across Russia, identifying factors that are crucial to the successful accommodation to the period of self-isolation and building strategies for future. RPS, in collaboration with the leading Russian universities supported by The Ministry of Science and Higher Education of the Russian Federation, has started a project "Research at Home." The purpose of this research is to assess psychological well-being among the student population ( $N = 6,550$ ) to develop evidence-based recommendations to decrease negative effects and increase positive consequences of self-isolation. The results obtained showed no differences in the levels of psychological well-being, significantly lowered levels of depression, anxiety, and stress during the period and higher levels of anxiety and stress during the period. It was shown that studying the impact of the pandemic on the mental health of students requires attention to possible dynamics of their mental state within relatively short periods and gender differences.

### India

In this stage of the pandemic, the focus is more on dealing with the pressures of the situation, which are mostly socio-structural. In the coming months, the focus has to shift to the psychological needs of people. The emotional impacts of what migrant workers are going through may be a major issue to deal with. The people are walking back to their villages in groups. The social, emotional, and economic costs are far more serious in developing countries like India as compared with developed nations. In the

next few months, these vulnerable sections of the society will need more psychosocial support. The government has to seriously look at the role of psychologists in providing the psychosocial and emotional support. The psychology associations have to come forward in providing more mental health-related services and training of psychologists to improve situational skills and competences to increase the accessibility of psychological services.

### China

The COVID-19 pandemic in China has gone through two phases. The first phase is for protecting and saving lives. Medical treatments are more important than psychological service. But, in the second phase, about 2 months later, psychological reaction or even psychological symptoms, or even mental disorders, especially PTSD, have emerged. For example, those who have witnessed the loss of lives, especially for medical doctors and nurses who had been working in arch hospitals. They knew how vulnerable humankind was in facing the virus. So Division of Nursing Psychology and Division of Medical Psychology, of the CPS, have been working very hard to provide services for medical staff, especially in the first 2 months.

In the first month, it is quite normal for people to react either mentally or behaviorally in stress. Then, in the second month, the third month and, now, the fourth month, upon the relief of the lockdown in May, life returned to the normal schedule in China. So it is a good time for us to reflect on our work, reflect on ourselves, to consider what psychologists can be of help in a future situation like this.

The CPS has done a lot since the lockdown because of COVID-19, the beginning of the pandemic. In the past 4 months, the Standing Committee of the CPS have met twice to make the strategic plans and arrangements of psychological support at the national level, during the lockdown, and after it was relieved.

Wenchuan earthquake in 2008 provided experience in psychological support in crisis intervention. Mental and behavioral reactions to a crisis like SARS and COVID-19 pandemic are varied but normal. In the second phase, trauma-related symptoms emerged and can become prominent. Therefore, CPS developed a three-level strategy for psychological service in the COVID-19 pandemic. The three-level-responding strategy to the pandemic brought up by the CPS included the following aspects. (1) Firstly, recruit psychologists with competence. CPS developed competence-enhancement programs for clinical psychologists right after the lockdown, in the end of January. The registration system of CPS has kept training registered psychologists, especially for crisis intervention to improve their competence in providing qualified services for all those in need. (2) Secondly, developing a response system in cooperation with governmental agencies. CPS work together with government agencies, NGOs, and foundations. They try to make sure that the strategic plans are active and sustainable. (3) Thirdly, target key groups in need of psychological service. CPS work with hospitals, schools, and community staff to find the key groups who have psychological problems, mental disorders, or even PTSD.

All institutions have voluntarily done their work. Psychologists set up hotlines, sent out teams working on the frontline, especially Wuhan City. And some of them edited books, developed apps and online programs for psychological services and counseling, and online psychotherapy and teletherapy.

Psychological services have been mentioned by China President Xi Jin-ping in his talks three times since the lockdown. Psychologists have been integrated in the work team for crisis intervention at both the national level and the provincial level. Medical teams were recruited in other provinces and sent to Wuhan or other cities in Hubei Provinces, and psychologists were included in those teams. Ten psychologists had been recommended and included in the National Team of Crisis Intervention, leading by the China Ministry of Crisis Intervention.

Psychological support has been provided in many ways. Counseling or psychotherapy has been provided for free all around China, especially for inhabitants in Wuhan City. Both Division of Personality and Division of Counseling or Clinical Psychology of CPS are affiliated to Central China Normal University, which is located in Wuhan City. Many colleagues working in the School of Psychology there have become the key team members working in the epicenter ever since the lockdown. Almost all universities with a department or school of psychology set up hotlines; for e.g., ShanDong Normal University, located in Ji'nan City, the capital of Shandong province, provides hotline service for the general population in Shandong province. A similar case holds for almost all capital cities of provinces across China.

For knowledge dissemination, many books have been edited, and many web pages have been developed. These can provide psychological knowledge and skills, helping people to adjust and cope with the COVID-19 pandemic. Technology was also employed to assist mental health. Different self-help apps have been developed to help general population online. Also, a wearable wristband with real-time physiological data acquisition, was used by nurses and doctors who work in frontline hospitals. The wristband recorded physical health parameters, mental health parameters and physical activity, providing a quick screening assessment of their (mental) health status.

The COVID-19 outbreak happened during the spring festival, which is a very unique opportunity for family members gathering together. And family dynamics have become a very strong basis of coping with the pandemic. The interpersonal relationship has never been so intensively tied. In this context, CPS has launched a Peace Mind Program, initiated by the Division of Crisis Intervention and Division of Psychological Institutions, together with the Institute of Psychology, Chinese Academy of Sciences. The Peace Mind Program has begun on January 28, right after the Spring Festival. They provided 94 lectures for either professional psychologists or for common civilians to disseminate psychological knowledge and skills. Online psychological assistance was also provided for different groups and professions, especially for policemen, medical professionals, and social workers in communities. We provide a hotline

where people can find help or counseling for themselves or for their relatives.

Another initiative, so-called "Thousands of Psychological Institutions for the Peaceful Mind," is a volunteer recruiting program. The program has recruited about 3,000 psychologists, and more than 400 institutions were involved in the program.

Altogether, 454 organizations were recruited in the Peace Mind Program to provide service in different settings. More than 1,300 medical staff received psychological services, including group therapy, an audio program for stress management. Two thousand four hundred sixty-three institutions have been provided psychological counseling services. More than 4,220 counseling sessions have been provided for individuals. Colleagues in China have composed more than 5,330 essays for knowledge dissemination to the public. For hotlines, nearly 100,000 counseling calls have been received; 77,000 online counseling inquiries have been provided. One hundred seventy-five thousand joined the 1-week program through the APP we developed, with 70% of the users finished the whole program. We also developed a self-evaluation questionnaire, and 187,000 individuals finished the online evaluation. For the video and audio program, we published online, there are more than 1 million views for the lectures, and more than two million play for the audio programs.

Research and project funding has been provided for those initiatives. All work we have done is to find the key groups in need. We realized that there is, still, a lot of work to be done. We hope that international communication and cooperation will give us more understanding of the mental and behavioral reaction to the COVID-19 pandemic and to the crisis in general.

For psychologists, we need to study more on mental and behavioral reactions in a crisis like this and how to provide effective services in the future. For psychologists in China, teamwork, especially work with government agencies and NGOs at different levels from national, provincial, city, and community levels, is very important.

Psychology as a profession in China needs legislation. Psychology as a discipline is very well-developed, but the legal status of the professional psychology profession is not quite stable. We have two kinds of mental health services: one is represented by psychiatrists and the other one is represented by clinical psychologists. These two versions of mental health services, of course, differ in many ways.

## South Africa

As part of the comprehensive national response, the South African government is implementing an eight-stage process to manage the COVID-19 pandemic (see **Table 2**). The eight stages are: preparation; primary prevention; lockdown; surveillance and active case-finding; hotspots; medical care (for the peak period); bereavement and the aftermath; and ongoing vigilance (SA Coronavirus, n.d.). The first two stages (i.e., preparation and prevention preceded the lockdown (Stage 3), which also coincided with alert Level 5 of the risk-adjusted response. What is to be done during Stage 4 (surveillance and active case-finding) coincides with alert Level 4 of the risk-adjusted response. During

**TABLE 2** | Eight-stage process to manage the COVID-19 pandemic [adapted from SA Coronavirus (n.d.)].

Stage	Stage 1: preparation	Stage 2: primary prevention	Stage 3: lockdown	Stage 4: surveillance and active case-finding	Stage 5: hotspots	Stage 6: medical care (for the peak period)	Stage 7: bereavement and the aftermath	Stage 8: ongoing vigilance
Actions	<ul style="list-style-type: none"> <li>Community education</li> <li>Establishing lab capacity</li> <li>Surveillance</li> </ul>	<ul style="list-style-type: none"> <li>Social distancing &amp; hand-washing</li> <li>Closing schools and reduced gathering</li> <li>Close the borders to international travel</li> </ul>	<ul style="list-style-type: none"> <li>Intensifying curtailment of human interaction</li> </ul>	<ul style="list-style-type: none"> <li>The Community response: door-to-door screening, testing, isolation and contact tracing</li> <li>The Community response: door-to-door screening, testing, isolation and contact tracing</li> </ul>	<ul style="list-style-type: none"> <li>Surveillance to identify &amp; intervene in hotspots</li> <li>Spatial monitoring of new cases</li> <li>Outbreak investigation &amp; intervention teams</li> </ul>	<ul style="list-style-type: none"> <li>Surveillance on case load &amp; capacity</li> <li>Managing staff exposures and infections</li> <li>Building field hospitals for triage</li> <li>Expand ICU bed and ventilator numbers</li> </ul>	<ul style="list-style-type: none"> <li>Expanding burial capacity</li> <li>Regulations on funerals</li> <li>Managing psychological and social impact</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring Ab levels</li> <li>Administer vaccines, if available</li> <li>Ongoing surveillance for new cases</li> </ul>

this stage, currently in place during the month of May 2020, the focus is on the community, intending to conduct door-to-door screening, testing, isolation, and contact tracing.

As from the beginning of June 2020, the country will transition into Stage 5, which coincides with alert Level 3 of the risk-adjusted response. Looking at **Table 2**, it is evident that psychologists will have a big role to play in Stage 7 (bereavement and the aftermath). With psychologists mobilized to play a role through structures, such as the HWCN, it does appear that the population will be able to receive some form of psychological services into the future as the pandemic continues to escalate.

## DISCUSSION/CONCLUSION

COVID-19 provided the context for the first comparative analysis of psychology status in the BRICS nations. As directors of national scientific societies, the authors have worked for the past 3 years to develop BRICS Union of Psychologists, before COVID-19. We have also worked on international communication and cooperation ever since the outbreak of COVID-19. For example, we have participated in the zoom meeting hosted by American Psychological Association at least twice a week, which aims at collecting information from colleagues around the globe.

In the comparative analysis of the actions of psychology in the BRICS countries, the first question that stands out is that the political and economic management of each country influenced the modus operandi of each representation of psychology. Psychological societies received support, encouragement, and even a direct political call for public policy actions for crisis management, psychoeducation, first psychological aids, and active listening directed to the public (population, health professionals, and patients). Moreover, all societies have engaged in confronting COVID-19 in public health at various levels, considering the impacts on mental health.

Although psychology acts to promote mental health in BRICS, only in Russia that psychology had a strong role in remote education in these early months of COVID-19. On the other hand, psychology in China was quickly organized, and this will

speed up the required legislation and professional preparedness. In China and Russia, the scientific societies worked closer and integrated with the government. In Brazil, psychologists are integrated into the public health system, and a large number of psychologists are registered in a federal regulatory council of their own, but telepsychology is underdeveloped; state governments are working with Federal and State Universities to provide telepsychology during COVID-19. In India and Brazil, there is a prevalent sense of dichotomized world view, in contrast with the strong interpersonal strengthening described in China.

Countries with large social inequalities faced more socioeconomic gaps that affect mental health, further straddling the health system weaknesses, as shown by Brazil, India, and South Africa. The interface between the socioeconomic and political moment might have contributed to the exacerbation of mental health issues in the early months of COVID-19. The various psychology organizations in these countries have tried to organize themselves independently or seeking to sensitize governments to articulate actions in favor of minority groups (indigenous people, people in situations of socioeconomic vulnerability, and people in rural areas). In general, interventions introduced included payment of a social relief grant or of a distress grant to the unemployed and an increase in the social grant amount paid to the indigent. Also, technological and/or socioeconomic inequalities in countries like Brazil, India, and South Africa did not allow online services (health, mental health, and education) to reach everyone (rural, indigenous population, the poorest, and the most vulnerable), in contrast to online education in Russia and hotlines, apps and wearables in China.

Despite this deficient access to online services in some of the BRICS nations, the expanded and extensive insertion of the telepsychology happened in all of them. The guidelines on this modality of online intervention were different for each nation and had to be reformulated due to the situation. In Brazil and South Africa, there were regulations being discussed under pressure, reformulated and adapted to the context of COVID-19.

Psychology has different roles in their societies, and the pandemic exacerbated the strengths and exposed some of the weakness. In a long and continuous tradition of Russian psychology, the government actions have a place for education, mental health, and refined identification, and intervention is possible, for instance, in emerging cyberbullying. China, the first country of the epicenter of the pandemic, has been working in this crisis, using previous experience and an organized psychological intervention in many levels of psychological care contextualized, with the support of integrated and expanded political and economic management that helped in facing the emotional issues. India has a prolific amount of actions and a recent mental care policy that will probably catalyze the experiences during the pandemic into better mental health services. Psychology in South Africa has a strong regulatory link with other health professions; as a result, the strategies were set for all health professions, and psychology benefited from that despite the low contingent of psychologists. In contrast, despite of the high contingent of psychologists in Brazil, telepsychology was not stimulated, and the strong public health system did not offer telepsychology to the general population; universities and scientific societies are leading the actions in mental health during COVID-19 in independent initiatives amid a complex political context. In general, psychology in BRICS has been making pioneer contributions during COVID-19 times.

Psychoeducation of the general population and building competencies of psychologists to work during and after the crisis are the main aims in BRICS. The different approaches of each country are related to the role of psychology in society, equity, and social context. The use of digital platforms and telepsychology has been one important resource that gives visibility to psychology and expands mental health care. In general, it is expected that there will be an increased role of psychologists in providing cultural sensitive intervention and information on socioemotional skills.

## AUTHOR CONTRIBUTIONS

KA and LB: design, integration of the authors' comments, and final manuscript. KA, LB, MM, MS, AP, MT, JM, AV, PS, BH, and TS: writing the draft. All the authors contributed to manuscript revision, read, and approved the submitted version.

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The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Accepting Restrictions and Compliance With Recommended Preventive Behaviors for COVID-19: A Discussion Based on the Key Approaches and Current Research on Fear Appeals

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COVID-19 (Coronavirus disease 2019) is a novel coronavirus which was first detected in late December 2019 in the Wuhan Province of China. This novel coronavirus, caused by a zoonotic beta-coronavirus (SARS-CoV-2), is described as highly infectious. The World Health Organization (WHO) named the novel coronavirus as COVID-19 on February 11, 2020, and declared it as a “pandemic.” Almost all countries have undertaken wide-scale precautions so as to prevent or limit the spread of the virus, with most having practiced some form of “lockdown” along with “social distancing,” as well as dispensed recommendations for proper hand washing, avoiding touching the face, wearing facemasks, and using disposable tissues when either coughing or sneezing. Whereas it is well known that slowing the spread of this new epidemic requires the cooperation of all citizens, some people still seem to willfully disregard the rules and guidelines, and thereby ignore the health risks posed to both themselves and to others they come into contact with. People have responded differently to lockdown rules and social distancing practices. Whilst the majority follow the rules and recommendations with great care, others are more lax or simply refuse to comply. These differences might be accounted for according to a number of factors including personal, social, cultural, mental, and economic variables. Being persuaded to comply with preventive rules, especially those concerned with health-related behaviors, also bring certain other factors into play. Fear is one of those factors, and is one of the most powerful. It is well known that fear-based appeals can be effective in inculcating health behaviors, with many theories having been developed in this area. However, both the content of the message (the level of the fear it contains) and certain personal variables can determine the persuasive power of the fear appeal. It can even have an adverse effect if not properly applied. Many theories have been developed to address the persuasive effectiveness

of the fear appeal (e.g., fear-drive theory, protection-motivation theory), and this study aims to discuss these individual differences in precautionary and preventive measures for the COVID-19 pandemic within the framework of the basic assumptions of these theoretical approaches.

**Keywords:** COVID-19, fear appeals, protection-motivation theory, fear-drive theory, extended parallel process model, pandemic, health behavior, health psychology

## INTRODUCTION

COVID-19 (Coronavirus disease 2019) is a new type of coronavirus which was first detected in late December 2019 in the Wuhan Province of China. This novel coronavirus, caused by a zoonotic beta-coronavirus (SARS-CoV-2), is described as being highly infectious. It affects the lower respiratory tract and can also manifest as pneumonia. Its most common clinical symptoms are reported as fever, fatigue, myalgia, dry cough, and dyspnea (Zhong et al., 2020). Coronavirus disease 2019 is regarded as a relative of SARS (Severe Acute Respiratory Syndrome) and also MERS (Middle East Respiratory Syndrome) (Sohrabi et al., 2020). The novel coronavirus outbreak was declared a Public Health Emergency of International Concern on January 30, 2020 and The World Health Organization (WHO) called for collaborative efforts worldwide in order to prevent the rapid spread of COVID-19 (World Health Organization, 2020b). The WHO named the novel coronavirus (2019-nCoV) as COVID-19 on February 11, 2020, and later declared it as a “pandemic,” meaning an epidemic on a global scale. Tedo Adhanom Ghebreyesus, the current serving President of the WHO, stated that the name COVID-19 is derived from the CO of “corona,” the VI of “virus,” and the D of “disease,” followed by the 19 of “2019” being the year of the disease’s official categorization.

The COVID-19 pandemic spread very quickly worldwide, with the virus having reached 215 countries and territories as of March 27, 2021, with 125,781,957 confirmed cases and 2,759,432 deaths attributed to the disease, according to the WHO (World Health Organization, 2020a). The economic and psychosocial consequences of this new epidemic have been wide-ranging, far-reaching, and unprecedented on a global scale; having caused not only significant death and serious health issues, but also severe economic problems, psychological pressures, and significant changes to daily life affecting human life worldwide. Negative psychological and economic consequences have also become another epidemic emerging alongside and as a result of the COVID-19 pandemic. The new pandemic and related economic recession has been found to be correlated with a 10-60% increase in deaths of despair in the United States alone (Socin, 2021). The COVID-19 pandemic, as a global crisis, has resulted in disruptions to both the supply and demand of various commodities in the world economy (Chudik et al., 2020). Unemployment rates have increased, and the International Monetary Fund (IMF) described the 2020 global economy as having shrunk to an extent not seen since the Great Depression of the 1930s<sup>1</sup>. COVID-19 has not only affected

the global population’s physical health, but has also been the cause of heightened anxiety, depressive symptoms, and stress; for example in China (Cao et al., 2020; Wang et al., 2020), Turkey (Bakioğlu et al., 2020), Israel (Tzur Bitan et al., 2020), Germany (Bendau et al., 2021), the United States (Taylor et al., 2020; Twenge and Joiner, 2020), Italy (Mazza et al., 2020), and Egypt (Arafa et al., 2021).

Numerous campaigns have been conducted in many countries to inform about the existence of COVID-19, its symptoms, means of transmission, the most at-risk groups, and the recommended precautions and preventative measures that should be taken. In order to prevent or limit the spread of the virus, governments worldwide announced new public policies such as social distancing, self-isolation, and self-quarantine (Anderson et al., 2020). People have been warned not to leave their homes (“lockdowns”), as well as being recommended how to properly wash their hands, to avoid touching their face, to use facemasks, adhere to social distancing advice, and to use only disposable tissues when coughing or sneezing. The global rates of those infected as well as numbers of deceased from COVID-19 are systematically announced through different channels of the media, with medical experts and government officials continuously warning of the serious risks presented by the virus.

Some countries have been shown to have quickly and successfully reduced infection rates, whilst some have been less responsive or effective (Hyland-Wood et al., 2021). It has been observed that not all campaigns have resulted in notable increases in effective preventive health behaviors, with individuals responding differently to lockdown rules and social distancing measures. While the majority follow these measures with great care, some largely ignore the advice and refuse to alter their behavior. These differences may be explainable through a number of determinants, including personal, social, cultural, educational, mental, and economic variables.

On the other hand, it is well known that “knowledge and attitudes toward infectious diseases” are highly associated with the level of panic emotion and, by association, with preventing the spread of communicable diseases such as COVID-19 (Zhong et al., 2020). It is therefore important to understand the public’s attitudes toward the disease, not only for helping them psychologically and physiologically, but also to help in persuading them to comply with the recommended preventive behaviors. Gerhold (2020) conducted a study with a German sample and found a negative correlation between age and the prediction of COVID-19 risk, and that females were more concerned about the new epidemic than their male counterparts. Research has shown that there has been a significant increase in

<sup>1</sup><https://www.bbc.com/news/business-51706225>



the levels of depression, anxiety, general stress, and posttraumatic stress related to COVID-19 (Fitzpatrick et al., 2020; Huang and Zhao, 2020). This increase has been found to be higher for those with pre-existing depressive or anxiety disorders (Asmundson and Taylor, 2020; Bendau et al., 2021). Also, recent studies have revealed certain gender-based differences in the fear experienced in relation to the COVID-19 pandemic. Females have significantly reported higher levels of fear of COVID-19 (Humer et al., 2020; Korukcu et al., 2020; Liu et al., 2020; Qiu et al., 2020; Reznik et al., 2020; Trnka and Lorencova, 2020; Tzur Bitan et al., 2020; Koçak et al., 2021; Pak et al., 2021), depression, anxiety, and stress (Mazza et al., 2020) than males.

The rapid spread of COVID-19 has caused substantial human psychological effect worldwide, as previously mentioned (Torales et al., 2020). One of these strongest psychological effects is fear (Pakpour and Griffiths, 2020). Traumatic life events such as the emergence of new endemic diseases can cause significant fear in many people, and as such has been evaluated as a “normal” and “functional” reaction (Witte, 1992; Ahorsu et al., 2020; Harper et al., 2020; Khan et al., 2020); however, in extreme cases, this fear may lead individuals to take extreme action and even to commit suicide (Bhuiyan et al., 2020; Dsouza et al., 2020; Griffiths and Mamun, 2020; Sher, 2020).

On the other hand, fear is also known to be an effective means of persuasion, if applied properly (Witte and Allen, 2000). According to the literature on the topic of persuasion, “fear appeals” are highly associated with dealing with risk-based health behaviors, and as such have been widely used to instill attitudinal change and for different goals (e.g., coping with addiction or preventive health behaviors) (Tannenbaum et al., 2015). Recent research has established that fear is positively related to compliance with COVID-19 preventative behaviors (e.g., Bashirian et al., 2020; Cypryńska and Nežlek, 2020; Winter et al., 2020). Harper et al. (2020) found that fear was the main predictor of positive behavior changes associated with the prevention of spreading COVID-19 (e.g., guidelines on social distancing and personal hygiene). Koniak and Cwalina (2020) found that fear of COVID-19 leads to more positive and supportive attitudes toward proposed restrictions than may have initially existed.

In the circumstances of the current global outbreak, healthcare professionals and social scientists have been guiding governments in developing policies to slow down the spread of the virus and to limit its impact. At this point, it is extremely important to issue informative and persuasive messages to the population in order to ensure a higher level of virus-mitigating behaviors are adopted so as to limit the spread of the virus, and thereby to protect both their health and the health of the community at large. Persuasive messages are created and sent to society through public service announcements and similar media in many countries. Undoubtedly, the use of fear appeals is seen as one of the most effective strategies applied to increase the strength of messages in health-related persuasive communication campaigns.

In the current study, the relationship between fear and persuasion will be discussed, and then basic theoretical approaches to fear appeals will be examined in detail. In this context, complying with preventive health behaviors will be analyzed based on each of these theories’ statements. In addition,

current research findings that address the relationship between fear appeals and adherence to recommended behaviors to protect against COVID-19, and thereby prevent the rampant spread of the virus, will be examined. In light of these theories and current research findings, the effects of health policies and fear-based communication campaigns that have been implemented since the beginning of the pandemic will be discussed. Finally, based on these theories, suggestions will be put forward on how to best apply messages containing fear in the most effective way in order to address the global impact of the COVID-19 pandemic.

## FEAR APPEALS

Fear is an adaptive emotional response to a real or a perceived physical or emotional threat that serves to stimulate the person to deal with potential risks (Gullone, 2000). Although it is considered as a negative emotion, under certain circumstances, fear can also be defined as “essential” and “functional”, as with anxiety. The optimal level of fear allows us to avoid vital or life-threatening dangers, as well as helping us adapt to the environment and to survive. For this reason, researchers working on persuasion presume “fear” to be an effective tool in replacing risk-inherent health-related attitudes (addictions, avoiding regular health checks, not adopting preventive health behaviors) with recommended attitudes and practices. In a recent study, Zettler et al. (2020) determined that the HEXACO personality domain of emotionality, which is described as excessive levels of fear, was associated with a higher level of acceptance of the restrictions aimed at slowing down the spread of COVID-19.

Fear appeals are persuasive efforts that intend to arouse fear by stressing the negative consequences (danger and/or harm) that could occur if individuals do not change their attitudes and/or practices in line with the official recommendations (Perloff, 2009; Tannenbaum et al., 2015). A fear appeal is typically structured as follows; “If you do not adopt the behavior recommended (purchasing, voting, believing, supporting, learning, stopping, etc.), you will encounter extremely negative or dangerous results.” For example, it is said that “smokers will contract chronic obstructive pulmonary disease if they do not give up the habit” or “people who do not brush their teeth regularly will soon lose their tooth if they do not develop this habit.” Considerable research has been undertaken on the persuasive effects of fear appeals (e.g., Rogers and Mewborn, 1976; Liberman and Chaiken, 1992; Eagly and Chaiken, 1993; Rogers and Prentice-Dunn, 1997; Das et al., 2003).

Although it seems a simple premise to awaken fear in people, research has shown that the same fear-arousing content does not necessarily have the same effect for all. Sometimes, a fear appeal could be less scary than the researcher’s expectation; whilst sometimes it is the opposite, with participants’ fear having become too exaggerated to take it seriously. As a result, research has shown the necessity of determining what scares who and to what extent. It is ineffectual to scare people more than necessary, just as it is to scare them too little (Morris and Swann, 1996).

Therefore, it is important to examine the variables that determine this during the current pandemic. Basic fear appeal theories provide explanations that serve this purpose. In the current study, as previously mentioned, it is aimed to make inferences in light of both the relevant theories and current research findings.

Many different theoretical approaches have been developed on fear appeals, with the following five approaches leading the literature; Health Belief Model, Fear-Drive Theory, Protection-Motivation Theory, Terror Management Theory, and Extended Parallel Process Model.

## Health Belief Model

The Health Belief Model (HBM: Hochbaum et al., 1952; Hochbaum, 1958) is one of the most commonly implemented approaches to preventive health behaviors (Rosenstock and Kirscht, 1979). It endeavors to predict health behavior in terms of certain specific belief patterns.

There are two main elements of health behavior: threat, and outcome expectations (Gehlert, 2006). The threat consists of the perceived susceptibility to health risk and also the perceived seriousness of that illness. In the case of the risks associated with being infected with COVID-19, the threat would involve believing that one was susceptible to acquiring the virus, and also that it was as serious as the health authorities portray it to be. The outcome expectations are the perceived benefits of a suggested behavior, such as using facemasks as a measure to prevent the transmission of the virus, and the perceived barriers to showing that behavior. Another element that has been added later as a separate concept is self-efficacy, which relates to confidence in one's ability to take action (Champion and Skinner, 2008).

The combination of these factors affects the probability of the behavior happening. According to this model, fear appeals will be more persuasive if they underline a person's perceptions about subjective susceptibility, benefits, barriers, and self-efficacy (Laranjo, 2016). The person will be more likely to adopt preventative behaviors if they perceive the health threat to be serious, that they perceive themselves to be vulnerable, and where the benefits of following the suggested behaviors outweigh the costs. If a person perceives that there is a severe threat to their health, and the perceived benefits outweigh the perceived barriers, then they will probably prefer to act in line with the recommended preventive health action.

## Fear-Drive Theory

According to Janis' Fear-Drive Theory (Janis, 1967), fear is a driver state that motivates individuals to adopt recommendations expected to mitigate a negative state. In the case of the fear aroused in response to a message, a need for fear reduction occurs that results in an attitudinal change (Walton, 2000). According to the drive theory, the more fear that is aroused, the greater the likelihood that the fear appeal will be successful. According to this model (Janis, 1967), there is an inverted U-shaped relationship between fear and attitudinal change. In this model, it is claimed that fearful messages create a motivational urge to attitudinal change; yet, on the other hand, in the case of causing excessive fear, the expected attitudinal change will decrease.

Janis (1967) argued that the undesired high level of tension that emerges as a result of a threat motivates individuals to ignore their fears instead of changing their attitudes and adopting the proposed attitudinal change. If the recommended new attitude suggests a certain way to avoid the frightening outcome, it is possible to reduce that fear by taking the recommended route. When attitudinal change is regarded as being powerful enough to reduce or end the fear, it can be perceived as a reward, and the individual motivated to act in line with the proposed new attitude. However, if the recommended attitude is perceived as ineffective in reducing the fear, the individual will likely choose to ignore the frightening result or to reject the fear message.

To summarize, according to this theory, it is critical to find the optimal level of fear appeal at which the likelihood of attitudinal change is maximized. If the level of fear is inadequate, the corresponding fear arousal will be insufficient to initiate the expected change. On the other hand, if the resultant level of fear is considered too high, the fear appeal may cause defensive processes such as message denial or threat derogation (Manyiwa and Brennan, 2012).

Persuasion literature on fear appeals, especially those related to health-related attitudes and behavioral changes, show that when the dose of fear is misaligned, people go into defensive mode and the effect of "unrealistic optimism" appears. The term "belief in a just world" inspires this effect; where the world is perceived as just, where people live in a world in which everyone gets what they deserve. Accordingly, good things always happen to good people and bad things only happen to bad people (Lerner, 1980). Thus, the misconception that "nothing happens to me," which is commonly observed, comes into play and forms a kind of defensive shield (Perloff, 2009). As a result, individuals who receive a fear appeal will show very little care about recommended attitudinal changes if they consider the likelihood of the fearful results to be negligible, especially when the dose of fear is significantly high. On the other hand, optimism bias can also be considered as a functional defense to cope with increased anxiety, stress and depression, especially among vulnerable groups in this process. In a meta-analysis study based on research conducted over a period of almost 70 years, it was revealed what qualifications a fearful message should contain in order to be considered persuasive (Nabi et al., 2008, 191). It was shown that such a message needs to address an important hazard through the optimal level of fear (i.e., high enough to convince the individual, but low enough not to cause undue anxiety or trigger defense mechanisms such as message denial or threat derogation) and to inform the receiver about the appropriate behavior/attitude that will enable them to avoid the risk.

The persuasiveness of fear appeals related to COVID-19 are also related to the main domains of fear. Several studies have explored these domains (e.g., Schimmenti et al., 2020; Taylor et al., 2020; Trnka and Lorencova, 2020) which include fear of contamination, fear of economic consequence, coronavirus-related xenophobia, fear of the body, fear of significant others, and fear of inaction, etc.

Fear is a subjective emotion and reactions to fear may vary from one individual to another (Mertens et al., 2020). There are apparent individual differences in tolerance for fear and

risk (Lunn et al., 2020). It is extremely difficult to determine which level of fear will have what effects on which individual, to estimate the optimal dose of fear appeal, and to generalize it within the process of a global health crisis such as the current pandemic. Such messages should be supported with empathic content in order to avoid leading to perceptions of “despair” and “an inevitable end,” fed with an anxiety-reducing positive content, and emphasize that it is possible to protect oneself from the mentioned risk by taking simple measures. Perceived self-efficacy also plays a critical role in the persuasiveness of fear appeals (Peters et al., 2018; Bavel et al., 2020).

Nevertheless, debate on the persuasive power of fear appeals has continued for many years. Empirical research on fear appeals has revealed conflicting results; and whilst many studies have shown fear arousal to be persuasive (e.g., Rotfeld, 1988; LaTour and Pitts, 1989; Miller and Millar, 1998), others have concluded just the opposite (e.g., Hovland, 1959). These conflicting results may be explained by the mediating effect of “efficacy” (Manyiwa and Brennan, 2012), and Rogers’ Protection-Motivation Theory (1975) draws attention to this emphasis.

## Protection-Motivation Theory

Rogers’ Protection-Motivation Theory (PMT) (Rogers, 1975) was first developed to form a conceptual explanation of the effect of fearful messages. Rogers (1985) then went on to expand the theory with a more comprehensive version that highlighted the cognitive processes underlying attitudinal change and added extensive explanation with regards to persuasive communication.

According to this theory, individuals will choose one of the adaptive or maladaptive coping strategies after receiving the message or risk encountering significant health issues. Motivation for protection from the danger (protection motivation) occurs as a result of the perception of the danger and the corresponding evaluation of the recommended coping strategies. The greater the elicitation of protection motivation, the greater the attitudinal change.

The perception of danger represents the perception of the probability of encountering the negative experience (risk), and of its seriousness. The evaluation of coping strategies includes two elements; “response (behavioral) efficacy” and “self-efficacy.” Response efficacy is about the capacity of the new attitude/behavior suggested in the message in order to be disconnected from the danger. Self-efficacy, on the other hand, relates to the self-confidence of the individual in successfully performing the proposed attitude/behavior (Norman et al., 2005).

Perceiving health hazards and assessing the efficacy of coping strategies can lead to “adaptive behaviors” (protection motivation) or “maladaptive responses.” Maladaptive responses are behaviors that will lead to health risks for the individual. Such responses include behaviors with negative consequences (e.g., consuming too much alcohol, avoiding regular health checks for serious health issues like heart diseases and cancer). According to this theory, fear appeals can change attitudes (individuals more motivated to protect themselves from danger) under only four conditions (Rogers, 1975);

- Perceived severity/noxiousness of the danger/risk,
- Perceived likelihood of the dangerous event’s occurrence, and the perceived probability of personal damage (vulnerability/susceptibility),
- Perceived effectiveness and power of the proposed attitudinal change (measures) to prevent the risk (response efficacy), and
- Perceived self-efficacy to successfully enact the measures and practicability/applicability of the proposed new attitude.

Rogers stated that the first two conditions deal with warning individuals to change their attitudes in order to protect themselves (protection), whilst the other two are about persuading them (motivation) that they can actually achieve what is required of them. Rogers indicates that this is largely dependent on the individual’s self-belief in their own skills and perceived behavioral control perception of the severity of an epidemic plays an important role in the attitudes exhibited toward, for example, the COVID-19 pandemic. It is of the utmost importance to accurately explain the seriousness of the situation, as well as its individual, social, and even global risks to the public without any time being wasted. This perception is one of the main determinants of whether or not individuals will adopt the recommended attitudes or exhibit the advised preventive behaviors.

Consistent with this assumption, a recent study by Kuper-Smith et al. (2020) revealed that the majority of the population in both the United States, the United Kingdom, and also in Germany underestimated the possibility of being infected, did not classify themselves as being within an at-risk group, or being a carrier/transmitter of COVID-19 compared to others. They reported that individuals exhibited an “optimism bias” which led them to mitigate the probability of becoming infected themselves or infecting others. In other words, it was seen that they assumed the notion that “nothing will happen to me.” It was also observed that there was a negative correlation between the perception of “the possibility of getting infected from others” and the perception of “the possibility of participating in hygiene-related behaviors (e.g., hand washing, and social distancing).” These results could be interpreted as there being a positive correlation between the low level fear of transmission and risk-inherent social behaviors.

The second condition, in short, concerns whether or not an individual sees himself as being at risk, and is also defined as a good predictor of the recommended preventive behaviors. Wise et al. (2020) reported that with COVID-19, especially during the initial stages of the epidemic, feeling personally at risk of infection was a greater predictor of engaging in preventive behaviors such as social distancing and handwashing practices. This is closely related to the “ego-involvement” emphasized in the long-established Social Judgement Theory (Sherif and Hovland, 1961; Sherif et al., 1965). The first campaigns on AIDS (Acquired Immune Deficiency Syndrome) was acknowledged not to have worked well largely due to low levels of perceived ego involvement (Larson, 1995). At that time, it was believed that



only practicing homosexuals and those from certain races were the at-risk groups, and that individuals who did not categorize themselves within these risk groups simply did not care about the messages or change their attitudes as a result. However, after the subsequent comprehension that “everyone is in the risk group,” the impact of the AIDS campaigns increased and more significant changes in attitude were seen.

The third condition answers the question, “which mitigation measures/recommended attitudes are available?” At this stage, it is extremely important to ensure that the goal of the recipient is to focus on the recommended solutions and to manage the crisis rather than focusing on their fears. If the epidemic is portrayed as a situation from which there is no escape and no remedy, individuals will panic due to high levels of anxiety and fear. Then, fear control takes over and they are unable to focus on the actual recommendations being put forward.

The final condition of “perceived self-efficacy” is concerned with the evaluation of the target person’s own ability to successfully enact the recommended measures. Encouraging people through persuasion tools such as “positive attributions” and “high expectations” can be a good solution. It is functional to state that they are believed to be able to achieve the task, and to emphasize feelings of unity so as to underline the importance of the social dimension of the spread. As reported by Harper et al. (2020), combining an acceptable level of fear with messages emphasizing personal capability can prompt safety-promoting behaviors such as personal hand hygiene and social distancing.

Using the PMT to predict preventive/protective behaviors, it may be said that those with high levels of perceived vulnerability, perceived severity of the virus, perceived effectiveness of the recommended behaviors, and perceived self-efficacy will be most likely to comply with the recommended COVID-19 protective behaviors. On the contrary, those who have a low perception of their risk, the seriousness of the virus, the effectiveness of the recommended behaviors, or their capability to following through with recommended behaviors will be less likely to engage in preventive or protective behaviors. Recently, several studies have attempted to predict the adoption of COVID-19 preventive behaviors based on PMT (e.g., Al-Hasan et al., 2020; Chong et al., 2020; Jørgensen et al., 2020; Kowalski and Black, 2021; Rui et al., 2021). Their findings have shown that efficacy beliefs predict compliance with recommended preventive behaviors in the case of COVID-19 (Chong et al., 2020; Jørgensen et al., 2020). Ezati Rad et al. (2021) found significant positive correlations between preventive behaviors for COVID-19 and perceived vulnerability, perceived severity, response efficacy, self-efficacy, and protection motivation. Kowalski and Black (2021) found that perceived severity and perceived effectiveness, and also the power of the proposed measures in preventing or reducing the risk (response efficacy) significantly predicted engagement and adherence with the recommended behaviors. Al-Hasan et al. (2020) found that higher levels of threat appraisal, coping appraisal, and intensity related to COVID-19 knowledge positively influenced social distancing adherence. Some studies have revealed that the best predictor of protective behaviors among the PMT variables is perceived severity (Anaki and Sergay, 2021; Rui et al., 2021).

## Terror Management Theory

Terror Management Theory (TMT) (Greenberg et al., 1986) asserts that mortality salience increases the potential for experiencing existential anxiety and creates a feeling of terror that negatively affects a person’s psychological wellbeing. Humans have developed two distinct buffers to cope with such feelings of terror and to feeling a sense of control over the unavoidable reality of our own mortality; and these are our cultural worldview, and self-esteem. These buffering systems alleviate existential terror by providing a sense of being a valued individual living within a meaningful world (Pyszczynski et al., 2021).

According to the model, death-related thoughts can lead individuals to either exhibit the suggested health behavior or to deny and avoid it when focused on thinking about it consciously. Proximal defenses are aroused in order to suppress such thoughts, or to push death away into the future by refusing to accept vulnerability to the risks, or motivating them to begin to act healthier in terms of their behaviors so as to ensure a longer life; namely, they lead to attempts to remove them from the consciousness. Nevertheless, in the case of thoughts about death, these are located on the fringes of our consciousness, distal defenses, which push the individual to maintain self-esteem and to cling to one’s own cultural worldview, which results in increased or decreased compliance to the proposed health behavior (Pyszczynski et al., 2021).

TMT is undeviatingly functional to understand individual responses to the current pandemic (Pyszczynski et al., 1999). According to Pyszczynski et al. (2021), the roots of the multidimensional costs (personal, social, economic, and political) of the COVID-19 pandemic are clearly based on the risk of dying from the virus.

In the COVID-19 case, the possibility of death or serious illness caused by the virus is extremely salient. Rapidly increasing mortality and intubation rates, as well as images of overburdened hospital wards make this even more evident. As such, it has been extremely challenging to manage this form of terror. Economic chaos, social isolation, human rights violations, contradictory and confusing explanations given from governments and/or scientists, as well as an infodemic spread by the mass media have also reinforced the existential anxiety and impaired our primary coping resources (FitzGerald et al., 2020).

Especially in the media, the constant informational flow regarding the virus has led to a proximal form of defense. This situation has led to an increase in problematic behaviors such as eating disorders (Ammar et al., 2020), and an increase in alcohol consumption (Furnari, 2021). Underestimating and trivializing the threat is, in a sense, another result of this defense. Dealing with positive illusions, such as not seeing one’s own age group or race at risk, evaluating the pandemic as a kind of political conspiracy, or underestimating its fatality or contagiousness, have all been exhibited. The proximal defense was also manifested by adaptive responses; compliance with recommended guidelines to avoid infection (such as maintaining social distance, hand washing, and the wearing of facemasks). Despite the ongoing information bombardment, death-related thoughts are not always at the center of consciousness. At this



point, efforts to embrace the cultural worldview or to increase our self-esteem may come into play. The high correlation between political orientation, taking the virus seriously, and adhering to recommended behaviors (Funk et al., 2020) can be considered as an indicator of distal defenses.

## Extended Parallel Process Model

The Extended Parallel Process Model (EPPM: Witte, 1994) could be described as an integration of the main theoretical perspectives on fear appeals such as Fear-Drive Theory (Janis, 1967), Protection Motivation Theory (Rogers, 1975; Maddux and Rogers, 1983), and Leventhal's Parallel Process Model (Leventhal, 1970; Leventhal et al., 1983). This theory was developed in order to illustrate the pathways that people use to appraise fear appeal messages, and the strategies they employ in response to the emotions evoked by such appeals. Although it is very similar to the Protection Motivation Theory, it contains differences in certain dimensions. Protection Motivation Theory suggests that maximum attitude change will be reached when both threat and perceived efficacy are high (Rogers and Prentice-Dunn, 1997). However, in the Extended Parallel Process Model, there are two separate types of motivation responses identified; "protection motivation response" and "defensive motivation response." Protection motivation responses result in the acceptance of fearful messages, whilst defensive motivation responses cause rejection of the message (Timmers and van der Wijst, 2007).

According to the Extended Parallel Process Model, we face two distinct sets of appraisals when confronted with fear appeals; "threat appraisal" or "response appraisal" (Witte and Allen, 2000). In the threat appraisal, as Rogers (1975) mentioned "susceptibility," we assess the possibility of facing a threat (e.g., "How likely am I to contract COVID-19?") and the severity of results connected to that threat (e.g., "How harmful is the transmitted virus?"). This step is about evaluation of the effectiveness of the fear component in the fear appeal. If the likelihood and the severity are evaluated as being low, the fear appeal largely fails and the target person stops processing the message. However, if they are both high, fear leads the target to proceed to the second step, response appraisal. This step involves the evaluation of two efficacies; "response efficacy" and "self-efficacy." Response efficacy is conceptualized as perceptions of the effectiveness of protective/preventive behaviors, whilst self-efficacy is about people's beliefs in their own abilities to properly perform the protective/preventive behaviors (Witte, 1994).

In the case of threat appraisals and efficacy appraisals being higher than necessary, danger-control responses are triggered, and the target is motivated to engage in the recommended behaviors contained in the fear appeal message in order to protect themselves. However, if the threat appraisal is high but the efficacy appraisal is lower, fear-control responses will occur and the target will engage in maladaptive coping strategies such as denial, delay, or defensive avoidance in order to control the tensions provoked by the fear appeal.

This model also suggests that when individuals are confronted with a fearful message, one of two parallel processes (or different mechanisms) will affect their attitude; "danger control" or "fear control" (Witte, 1994). Danger control is the process that takes

place when an individual believes that they can cope with the frightening result being emphasized in the message if they apply the recommended attitudinal change. For example, belief that following a recommended diet in order to cope with health problems caused by diabetes will work and succeed as desired. Fear control, on the other hand, is the process that happens when the individual focuses on how to cope with the fear that they are experiencing, instead of how they will actually deal with the frightening result they are facing.

An effective fearful message must include two main components; "danger" (a danger/risk/problem that the individual may encounter) and "detailed information about the solution" (what to do in order to deal with the problem). Such a message should first frighten the individual to a sufficient level and warn against existing dangers, and should include two different kinds of information;

- "Severity information" – E.g., Smoking can lead to a heart attack,
- "Susceptibility information" – Warning individuals about at-risk groups (e.g., All smokers are at risk of having a heart attack at an early age).

In order to achieve this, two types of information should be included; information about what they are at risk from, and the solutions they should follow.

In addition, they need to believe that these solutions will actually work and that they themselves can achieve it. In order for this to happen, two kinds of information must be included;

- "Response efficacy" – Information that emphasizes the effectiveness of the recommended attitude (e.g., Quitting smoking considerably reduces the risk of having a heart attack),
- "Self-efficacy" – Information that motivates the individual that they can cope with the problem (e.g., You can quit smoking. Millions of people have succeeded, and you can do it too).

In line with this information, the individual will enter into one of these two "parallel processes." As previously explained, if the individual believes that they can cope with the danger, they will feel better able to face it and focus on the required solutions when executing the "danger control" process. However, if the individual believes that they are faced with serious or insurmountable danger, then they will more likely focus on their fear rather than the solution, and will enter the "fear control" process in order to try and cope with the fear rather than the danger.

To summarize, there are four basic variables in this theoretical perspective; with two related to evaluations about the threat, and two related to efficacy. In the case of the COVID-19 pandemic, the questions we need to face in terms of measuring these variables can be exemplified with the following:

Threat variables:

- Perceived severity – How serious do you think the consequences will be if you become infected with COVID-19?

- Perceived susceptibility – How possible is it that you might contract COVID-19?

Efficacy variables:

- Response efficacy – How effective do you think the recommended solutions are, such as social distancing, using a facemask, and proper handwashing at preventing COVID-19 infection?
- Self-efficacy – How confident do you feel that you could successfully follow the recommended solutions to avoid contracting the virus?

In 2006, within the Communication for Healthy Living (CHL) Project in Egypt (2003-2010), a national communication strategy was developed in order to prevent the spread of Avian Influenza (H5N1). In the campaign, the Extended Parallel Process Model was employed to persuade people to conform to certain health recommendations (Health Communication Capacity Collaborative, 2015). The study observed that whilst individuals perceived the threat posed by Avian Influenza as remaining high over time, their perceived efficacy to deal with the threat increased substantially.

The extent to which a person feels threatened by a health problem determines their motivation to act; while their confidence to efficiently decrease or prevent the threat defines the action taken.

It could be said that, in the case of a perceived threat being greater than the perceived response efficacy and self-efficacy, the probability of enacting behavioral change will likely decline. Therefore, it is extremely important to form a message that maintains balance between these two components. Message recipients must recognize that they are at risk, but at the same time understand that there are effective ways of coping with the risk and that they are capable of taking the necessary action (Witte and Allen, 2000).

Zhang (2021) found that severity and response efficacy were positively related to compliance behaviors. Increasing severity and response efficacy perceptions may be key in promoting compliance behaviors. Lithopoulos et al. (2021) conducted a test that applied EPPM in the context of the novel coronavirus disease (COVID-19) on a Canadian sample that consisted of 1,055 participants. Intentions to follow government recommendations, physical distancing, and fear control responses (i.e., negative and defensive reactions) were predicted using EPPM (perceived threat and efficacy). Consistent with the EPPM, they explored that individuals with high perceived threat and perceived efficacy scores had high intentions to comply with the recommended protective acts, physical distancing, and low fear control. Perceived efficacy was seen as the strongest predictor in their study's analysis.

## DISCUSSION

Individuals react to risks in many different ways; some immediately follow the recommended behaviors, whilst others opt for more harmful reactions including ignoring the reality of

the risk and continuing to exhibit risk-inherent behaviors (Taylor, 2019). Although being aware of the risks of unsafe health-related behaviors, some people prefer to disregard messages designed to motivate them into changing their attitudes and choose instead to maintain their existing habits despite the warnings (e.g., Smoking Kills!) (Martin and Kamins, 2010). This personal difference is related to many variables including individual, sociopolitical, and cultural differences. A clear example of this has been seen with the COVID-19 outbreak, and which has been witnessed closely across societies on a global scale. As emphasized in detail in the current study, the use of fear appeals have effectively persuaded many people to avoid unnecessarily health risk behaviors and to practice more appropriate preventive behaviors deemed useful in dealing with global health problems such as the current pandemic.

Recent studies have revealed a relationship between fear and COVID-19 prevention behaviors (e.g., Chang et al., 2020; Harper et al., 2020; Anaki and Sergay, 2021). For example, Harper et al.'s (2020) study revealed that people who are more fearful about COVID-19 engage more with the recommended preventive health behaviors such as regular hand washing and social distancing practices. As previously noted, Zettler et al. (2020) found that the emotionality domain (i.e., having extreme levels of fear, anxiety, and reactivity) of the HEXACO personality was positively correlated with an agreement with government-mandated restrictions.

It is well known that fear is an adaptive response in the presence of a threat. On the other hand, it is more liable to become chronic or acute rather than adaptive in extraordinary situations such as pandemics (Mertens et al., 2020). At this point, as assumed in all five of the aforementioned theories, it is vitally important to set the correct level of fear when issuing fear appeals to individuals who are perceived to be in a vulnerable emotional state. As previously mentioned, according to the Fear-Drive Theory, there is an inverse U-shaped relationship between fear and attitude change; fearful messages create a drive to attitudinal change, but, in the case of excessive fear, the expected change in attitude actually decreases. On the other hand, a low dose of fear may also cause individuals not to take the situation seriously enough, not see themselves at risk, and therefore not to heed the warnings or to obey the rules. According to terror management theory, sometimes fear appeals based on severe health risks can encourage people who gain self-esteem from risky behaviors to continue to exhibit those same errant behaviors. Then there is the “boomerang effect” (or “forbidden fruit effect”), which comes about through an increase in undesired risky behaviors, instead of following the recommended practices (Wolburg, 2006). Briefly, the necessity of adjusting the dose of fear is a well-proven concept.

It is also critical to prevent the spread of misinformation, which can lead to underestimation of the criticality of an epidemic (e.g., “nothing will happen if your immunity is good,” or “nothing will happen to individuals in the younger age group”) and blocking the transmission of incorrect messages explaining how to cope with the epidemic can prove very difficult, or even impossible in today's multimedia online world. In the fight against COVID-19, it has been observed that many countries have placed too much emphasis on certain risk groups, and

announcing that young people face a much lower level of risk has resulted in a significant reduction in their compliance with the recommended guidelines and imposed rules.

We could say that fear appeals on COVID-19 should include not only threats and risks, but also efficacy variables in light of the theories discussed in this review. The level of fear should be determined carefully in order that it does not unnecessarily lead the target audience to “fear control” rather than “danger control.” Creating effective public service announcements that include solution-oriented messages can be very persuasive if sufficient attention is paid to the level of fear aroused, and in motivating citizens that it is possible to protect themselves and society as a whole.

The significance of following the recommended measures and the other preventive behaviors must be underlined, not only as a personal health decision but also as an act of social responsibility. It should be openly declared that a pandemic requires a general community-wide approach if the mitigating actions are to achieve the desired effect. Coping with the presence and ubiquitous spread of COVID-19 requires handling as a collective aspiration rather than a set of personal goals. Researching the factors underlying the attitudes and behaviors of those who do not follow the rules is thereby also crucial.

The self-related appraisals about future events are generally optimistically biased: we consider that negative events are less likely to happen to us than to others, while the positive may be more likely. As previously mentioned, Kuper-Smith et al. (2020) argued that this bias leads people to perceive the possibility of them becoming infected, or infecting others as asymptomatic carriers, as lower than for other people. In the same study (Kuper-Smith et al., 2020), it was seen that participants from all three countries in their study (the United Kingdom, Germany, and the United States) shared optimism bias. In this process of managing a global pandemic, being aware of such biases, and exploring the underlying causes and their consequences, can help guide those responsible to form and issue persuasive messages that will further increase compliance with the recommended preventive behaviors.

On the other hand, the cultural differences observed in terms of compliance with the authorities should not be ignored when examining this kind of attitudinal change and or levels of compliance. In some countries, citizens seem to follow social isolation and lockdown rules more readily than elsewhere. For example, Anaki and Sergay's (2021) research found that people in the United States and Europe reportedly adopted less COVID-19 related precautionary behaviors than people in Asia. Current and future research on this situation will also provide significant benefits to these and similar struggles faced by today's national and international authorities in tackling the COVID-19 pandemic.

Being an individualistic or a collectivistic culture determines the sense of unity, interdependence, and compliance with social norms (Triandis, 2001). In individualistic cultures, the bonds between the members are considered loose; as they generally only look after themselves and their immediate family. But in the collectivist culture, people are considered interdependent, with large interconnected extended family structures, where

the interests and decisions of the collective group come first based on their shared interests. Individualism tends to predominate in developed and Western countries, whilst collectivism predominates Eastern countries (Hofstede, 2011). Civics of the collectivistic eastern countries have innate cultural characteristics such as a greater tendency toward the obedience of authority, endurance, and self-discipline, and they succeed in remaining calm despite being subjected to far-reaching and often draconian restrictions in the fight against the pandemic.

Coronavirus disease 2019 protection behaviors appear closely related to the dependency/independency dimension of each culture. Interdependence cultures such as in many Asian societies afford priority to social rather than individual goals, and instill a naturally high sense of duty and communal responsibility. The importance given to social norms and the suppression of individual interests has been seen to result in greater levels of compliance with rules in such cultures (Bavel et al., 2020).

Similarly, being a tight or a loose culture also seems to be very decisive at this point. According to Gelfand (2020), it is highly related to having a “tight” or “loose” society. Tight societies are represented with strong norms and a low tolerance of deviant behavior. On the other hand, loose societies have relatively flexible social norms and a high tolerance for undesirable behaviors. Tight societies are the rule-makers, whilst loose societies are the rule-breakers. Typical “tight” societies such as Japan, Singapore, and Hong Kong have shown effective responses to COVID-19. In these countries, regularity is part of daily life, and strict, robust laws and social coordination have been shown to save lives when faced with health-related hazards such as a pandemic, especially during the early initial spread of a virus. These countries often have significant experience living with the threat or recent history of wars, natural disasters, and epidemics. Loose countries, on the other hand, like the United States, Italy and Spain are well known as more being permissive and have a softer rule-based society; and as a result face significant difficulties in managing crises such as a pandemic (Gelfand et al., 2011). Tightness-looseness indicates the extent to which social norms are pervasive, clearly defined, and reliably imposed (Gelfand et al., 2011). According to Gelfand (2018, 3), being tight or loose “not only explains the world around us but actually can predict the conflicts that will erupt—and suggests ways to avoid them.” So it could be seen as an important predictor of the ability to manage crises such as a global pandemic.

Tight cultures have generally encountered more historical epidemics, warfare, and natural disasters such as earthquakes, and the importance of applying strict rules, low tolerance for deviant behavior, and acting together in such cases has been experienced in terms of survival (Dong et al., 2021). However, in loose cultures, where freedom and individuality are highly valued when threats such as epidemics arise, it may be more difficult to become organized as a society in order to act collectively, and the restriction of freedoms is questioned far more. It is known that tight cultures such as Singapore, Japan, and China have strict social norms, and that rule violations are punished more severely in such cultures, while loose cultures such as the United States, Italy, and Brazil are more permissive (Bavel et al., 2020).

Dong et al.'s (2021) study revealed that cultural tightness is a protective factor against psychological disorders in the COVID-19 pandemic. It moderates the positive relationship found between the risk perceptions of COVID-19 with psychological disorders. Additionally, the same study showed that in these cultures people are protected from psychological disorders by the high levels of perceived protection efficacy. In another recent study, Zhang (2021) applied Hofstede's cultural orientations (collectivism, power distance, long-term orientations, and indulgence) to examine the Extended Parallel Process Model (EPPM) (severity, susceptibility, self-efficacy, response efficacy, and compliance behavior) variables. The study's findings showed that different fear appeal variables work differently according to certain cultural orientations. These results could be used as a functional guide to psychological prevention, and to predict compliance with protective behaviors such as those recommended in tackling the COVID-19 pandemic, and also for future probable outbreaks.

Hofstede (1980) asserted that all individuals are culturally "coded" from early childhood, and that our behaviors are generally culturally determined. Cultures also differ in their avoidance of uncertainty. A society's tolerance for ambiguity indicates the extent to which a culture programs its members how to feel (comfortable or uncomfortable) in unexpected circumstances. It seems that avoiding cultures attempt to reduce the probability of such situations by forming strict behavioral codes, laws and rules, and an almost inbuilt disapproval of deviant beliefs and actions (Hofstede, 2011). New studies, therefore, that examine the individual differences observed in coping with COVID-19 based on culture may also prove eminently functional for our future understanding of the subject and how best to tackle it.

According to International Human Rights Law, every human has the right to the highest available standard of health. Governments have a responsibility to prevent all kinds of threats to public health, and likewise to provide medical care to those in need. It also emphasizes that, in cases of severe public health threats such as pandemics, careful attention should be given to human rights, and applications should be neither arbitrary nor discriminatory, but based on human dignity (Human Rights Watch, 2020). At the same time, it also declares that in cases of serious public health threats such as pandemics, restrictions can be justified when they are rigidly necessary, based on legal grounds and scientific data, respectful of human dignity, and proportionate to reach the goals (Amon and Wurth, 2020). In processes invoked in response to COVID-19, it has been seen that inappropriate policies have led to numerous human rights violations such as ageism, discrimination, and stigmatization (Mykhalovskiy et al., 2020), and more recently in terms of inequalities seen in access to COVID-19 vaccines. Public messages and health politics related to COVID-19 should be constructed based primarily upon a human rights approach. It is essential to combat stigma and discrimination, to respect privacy, to avoid blaming those who do not comply with the recommended measures, and fight inequities in the access to healthcare and vaccines (Mykhalovskiy et al., 2020). In addition to all of these human rights violations, there are other

ethical issues to consider in the communications regarding protective measures: social distancing, the wearing of facemasks, restricted public gatherings and even private gatherings, as well as personal hygiene such as handwashing (Guttman and Lev, 2021). Handwashing and hygiene-related measures invoke certain ethical issues due to the reality of global inequity of having access to a clean and reliable water supply. Suggestions for maintaining social distance and distance-learning educational practices have brought about other examples of inequality. The suggestion to "stay at home" and to "work from home" is not readily applicable to individuals of many trades or all professions. There are also inequalities in terms of access to the necessary technological tools and infrastructure needed in terms of working or studying from home, communicating with significant others via online means, or to attending compulsory schooling through distance education.

Multidisciplinary rather than solely medical approaches are needed in order to cope with the rapid spread of a pandemic such as with COVID-19. It is essential to understand the human behaviors, attitudes, and underlying beliefs and rationales in order to be able to develop policies that are more effective on the ground. Only such an approach can contribute to the understanding of why different people have responded so diversely to the calls made by health and political authorities in the case of COVID-19 to reduce physical interaction levels and thereby the spread and impact of the disease.

In order to explain human behavior in a multidimensional context and to develop persuasive communication strategies, support is needed to be drawn from the social sciences; more specifically, from the disciplines of psychology, sociology, anthropology, and social psychology. New research is needed from the scholars of these disciplines in order to explore why people have responded so differently. Examining global health problems such as the current pandemic from the social psychological perspective could benefit not only the general public, but also politicians, educators, scientists, policymakers, and health authorities. Therefore, it is important to analyze these problems not only by conducting empirical research, but also in discussing the results according to both the traditional and contemporary theoretical perspectives. These issues should be discussed based on different theoretical approaches and from different disciplines' perspectives in order to gather the most appropriate practical solution suggestions to cope with the COVID-19 pandemic.

## RECOMMENDATIONS FOR AWARENESS CAMPAIGNS

From the beginning of the COVID-19 pandemic, images and text-based messages with exaggerated and/or sensitive content with the potential to cause psychological trauma started to spread on a global scale, in newspapers, televisions, and through the ubiquitous world of social media. It was seen that pictures of individuals who had died from the virus, were hospitalized and intubated in intensive care units, and publicity shots that emphasized how the disease was rapidly progressing and had a



significantly high mortality rate were shared. It has since been revealed that these messages increased the fear, anxiety, and stress levels of many people, and for some triggered seriously traumatic emotions (Dong and Zheng, 2020). Research has shown that individuals over the age of 65 years old were faced with ageist attitudes and stricter restrictions, whilst various group members identified as being “vulnerable” (e.g., healthcare providers or those already suffering from a chronic illness) were confronted with these negative outcomes to a much greater degree (Tzur Bitan et al., 2020; Trnka and Lorencova, 2020).

Although considerable evidence exists regarding the relationship between fear appeals and attitudinal change in general when it comes to disease prevention behaviors, this relationship is by no means simplistic or clear-cut. Sometimes, contrary to what is supposed in the theories, independent from the level of fear awakened, the fearful message can also be ignored, leading to defensive avoidance, or it may be so ineffective that no significant behavior change occurs (Heffner et al., 2021).

During the current pandemic, fear appeals used in health communication messages (e.g., public service announcements, posters, social media posts) have utilized graphic images and scary language to stimulate fear and to underline the negative consequences of not following the recommended behaviors (Stolow et al., 2020). However, depicting alarming and shocking scenarios can have a harmful effect, especially among those considered to be vulnerable (Lin et al., 2020; Trnka and Lorencova, 2020). Messages underlining the gravity of the pandemic could exacerbate pre-existing mental health problems such as anxiety and stress. In order to avoid such unwanted results, public messages must be designed in a way that explains appropriate ways to cope with the risks, and to increase self-efficacy in the population (Stolow et al., 2020).

The theories discussed in the current study emphasize how to deal with unwelcome negative consequences of using fear appeals. For example, in line with the EEPM's explanations about protection motivation, public messages that support the power of the proposed measures, besides the severity of the risk, such as “The COVID-19 virus is dangerous, but do not worry, it is easy to protect you and your loved ones; wear a facemask, keep your distance from others, and wash your hands often” could be effective. It has been revealed that fear appeals are more effective when the message includes efficacy, emphasizes the severity and vulnerability of the risk, but clearly underline the applicability and functionality of the recommended measures (Tannenbaum et al., 2015). Recent studies have shown that public health messages that focus on the severity of the virus and the efficacy of the preventive behaviors are deemed to be more effective (Anaki and Sergay, 2021; Kowalski and Black, 2021; Lithopoulos et al., 2021; Rui et al., 2021).

However, some researchers oppose this method to avoid unintended consequences, which may cause the “fear control” mentioned in the fear-drive theory, and some negative socio-behavioral outcomes such as distrust in health authorities, skepticism of health messaging, and resistance to engaging in the recommended behaviors (Stolow et al., 2020), and also “news avoidance” (Tunney et al., 2021).

According to Guttman and Lev (2021), appealing to positive values such as compassion and solidarity can be an effective communication approach in cases like epidemics, where the welfare of the individual depends upon collective actions. In collective threat situations, it is useful to impart messages to the general public regarding the need to stand together and to emphasize the ethos of “Together, we can overcome this.” This strategy could prove especially efficient in the case of the COVID-19 pandemic in ensuring that individuals who are in the low-risk group comply with the restrictions and support the more vulnerable members of society by considering the general population as a community (Guttman and Lev, 2021). Many different examples of this have been witnessed; for example, the United Nations' COVID-19 Response Creative Content Hub contains a variety of materials on prosocial acts including messages such as “Together we can overcome,” “Save people, donate to fight COVID-19,” “Follow the instructions, relax and donate,” and “Spread positive ideas, stay hopeful, stay safe” (United Nations, 2021).

Using war-type terminology (e.g., beating, fighting, enemy, weapons, victory) to motivate people to comply with the recommended COVID-19 related measures is another common communication strategy employed by political leaders (for example, former US President Trump), and also the mainstream media (Bates, 2020). Although this rhetoric seems to serve to stimulate a sense of unity against a common enemy, it is a tactic used to justify strict measures of human rights violations. On the other hand, although it seems that it aims to create solidarity, it also triggers othering, discrimination, and stigma (Venkateswaran, 2020).

There is some evidence that prosocial persuasive appeals could be more effective than fear appeals (Shen, 2011). According to Heffner et al. (2021), appeals that use prosocial language to underline the positive results of recommended behaviors can trigger positive emotions such as hope and joy, and therefore could be more effective than fear appeals in enhancing perceived efficacy.

For example, Heffner et al. (2021) used a fear appeal in their research, which included the severity of the virus and the vulnerability: “The coronavirus is coming for you. When it does, your healthcare system will be overwhelmed. Your fellow citizens will be turned away at the hospital doors. Exhausted healthcare workers will break down. Millions will die. The only way to prevent this crisis is social distancing today.” In the same research, another appeal that focused on self-efficacy and response efficacy was given to the participants with a prosocial language: “Help save our most vulnerable. Together, we can stop the coronavirus. Everyone's actions count. Every single person can help to slow the crisis. We have the tools to solve this problem. Together, and by self-isolating, we can save millions of lives.” Their findings showed that both threat and prosocial messages were equally able to stimulate compliance with the recommended COVID-19 preventive behaviors. Therefore, considering the findings show that restrictions increase clinical mood disorders, it seems more reasonable to choose public health messages that activate positive emotions instead of fear appeals

in order to increase compliance with restrictions and other preventive health behaviors. They also should be accurate, based on real data, and be transparent. They should be empathetic, and not include blaming or shaming; far from a paternalistic and authoritarian orientation, they should emphasize trust in the public, describe the rules in simple and easy-to-follow language, and highlight their practicality, ease of application, and their functionality.

Stolow et al. (2020) also proposed the use of supportive and evidence-based health communications over fear-based that explain step-by-step what can be done in order to protect themselves and society as a whole. They advised on innovative alternative strategies such as using appeals by opinion leaders and celebrities, education-based entertainment, and humor as

means that could be employed as alternatives to fear appeals for the avoidance of the aforementioned unintended results. According to Guttman and Lev (2021), communication strategies should be based on the essential principles of human rights, including autonomy, equality, dignity, and privacy (Guttman and Lev, 2021). Appeals to prosocial values could be used as well as or instead of the fear appeals in light of the positive psychological perspective.

## AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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# Risk of Developing Post-traumatic Stress Disorder in Severe COVID-19 Survivors, Their Families and Frontline Healthcare Workers: What Should Mental Health Specialists Prepare For?

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Given the high mortality of the coronavirus disease 2019 (COVID-19), having severe COVID-19 may be a life-threatening event, especially for individuals at high risk of complications. Therefore, in the article we try to answer two questions that are relevant to public mental health: Can we define groups who are at higher risk of developing pandemic-related PTSD? How can health specialists prepare for it? Given the results of previous research on PTSD in epidemic (e.g., SARS) survivors, we suggest that mental health professionals in countries touched by the pandemic should prepare for an increase in the PTSD prevalence, specifically in: individuals who have had severe COVID-19; family members of these patients and of patients who have died; and frontline healthcare workers witnessing COVID-19 patients' sudden deaths, or numerous life-threatening situations. We postulate that these groups at risk should be routinely screened for PTSD in primary medical and pediatric care. Mental health services should prepare for providing therapeutic interventions for individuals with PTSD in the vulnerable groups, and support to their families, especially children.

**Keywords:** coronavirus disease, post-traumatic stress disorder, severe acute respiratory syndrome, prolonged grief disorder, family, healthcare worker

## INTRODUCTION

The COVID-19 pandemic covered 223 countries, 136,291,755 individuals with confirmed infection and 2,941,128 deaths as of April 13, 2021 (1). Globally the case mortality rate from COVID-19 is 10.4 deaths per 100,000 inhabitants but it varies widely by region and country, with as high as 84.9 in Belgium, 67.5 in Andorra, and 64.3 in the United Kingdom (2). Age is the main risk factor for complications and death as a result of COVID-19;

the disease death rate varies from 0.2% for individuals aged 10–39 years to 21.9% in people over 80 years. Death rate also increases in patients with pre-existing comorbid conditions, such as history of metastatic solid tumor (57%), myocardial infarction (47%), cerebrovascular disease (39%), congestive heart failure (37%), hemiplegia (34%), malignant neoplasm (27%), diabetes (20%), dementia (20%), chronic pulmonary disease (16%), hyperlipidemia (11%), and hypertension [8.4%; (3–5)]. Given the high COVID-19 mortality, the severe disease may be life-threatening and as such may be considered a traumatic event, especially for individuals at high risk of complications and death (6–8).

People who are exposed to traumatic events can develop post-traumatic stress disorder (PTSD). PTSD is a serious mental disorder that can develop in persons exposed not only to actual or threatened death, who directly experienced the traumatic event(s), but also in those who witnessed such an event personally, learned that the accidental or violent event occurred to a close family member, or friend or experienced repeated or extreme exposure to aversive details of the traumatic event personally. Such an event is criterion A for PTSD in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition [DSM-5; (9)]. PTSD causes severe distress or impairment in psychosocial functioning and is marked by four main types of symptoms that last for at least a month, being, respectively, the criteria B, C, D, and E for the disorder: (i) intrusions associated with the traumatic event, e.g., involuntary distressing event-related memories, dreams, and flashbacks, or physiological reactions to cues that resemble the traumatic event; (ii) avoidance of event-related stimuli, i.e., internal (memories, thoughts, and feelings) or external (people, places, situations) reminders; (iii) negative alterations in event-related cognitions, and/or mood, e.g., inability to remember an important aspect of the event, distorted cognitions about the event leading to blaming himself or herself or others and/or persistent negative emotional state and inability to experience positive emotions, diminished activities, and/or detachment from others; and (iv) event-related increased arousal and reactivity, e.g., difficulty sleeping and concentrating, reckless or self-destructive behavior, and being easily irritated and angered (9). PTSD individuals are 2–5 times more at-risk of suicidal ideation, suicide attempt, and deaths by suicide (10). Previous research indicates that about 80% of individuals with PTSD have at least one other comorbid disorder, in particular: depressive and anxiety disorders, as well as substance use disorder (11, 12).

Given the exceptional epidemic situation we are facing now, can we define groups at high risk of developing pandemic-related PTSD? What steps can mental health specialists take to prepare for it? In the following paper we will briefly address these issues.

## WHAT GROUPS HAVE HIGH RISK OF DEVELOPING PANDEMIC-RELATED PTSD?

We believe that mental health professionals in pandemic countries should be prepared for an increase in the PTSD

prevalence in three specific groups during COVID-19 pandemic and later: (i) individuals who have had severe COVID-19 and who feared imminent death from the disease; (ii) family members of these severely touched patients or patients who have died as a result of the disease; and (iii) frontline healthcare workers (HCWs) witnessing COVID-19 patients' sudden deaths, or life-threatening situations.

## Severe COVID-19 Survivors

Among COVID-19 individuals, those with a severe course of the disease are particularly at risk of developing PTSD (6–8). Patients who had to undergo medical interventions to maintain or restore vital functions experience particularly intense traumatic stress (13, 14). A very traumatically stressed subgroup may also include individuals with severe disease who were refused health care as a result of health service failure during a pandemic (15, 16). The meta-analysis of 35 studies involving 79,170 people with COVID-19 (17) showed that almost a quarter of them (23%) develop a severe form of the disease (35 studies, 79,170 patients) which requires close monitoring. The total percentage of patients admitted to the intensive care unit was 11.0% (39 studies, 80,487 patients), with no significant differences between various countries or regions (17). The life of many of these individuals is threatened and many of them may experience high levels of fear of imminent death, which creates a traumatic event.

The effects of the current as well as of past epidemics on the mental health of survivors can help predict the psychopathological consequences of a severe life-threatening viral disease. Two Italian studies on recovered severe COVID-19 survivors reported that the prevalence of PTSD is 10.4% (8) and 30.2% (7), respectively. Additionally, in survivors of the severe acute respiratory syndrome (SARS) during the epidemic that covered 29 countries in 2002/2003, infecting 8,096 individuals, of whom 774 died PTSD was present in 39% of patients 10 months after discharge (18), and over time the frequency of PTSD even increased, ranging from 42 to 54.5% after 31–51 months from discharge (18–20). Given that an estimated 3.6% of U.S. adults had PTSD in the former year, and the lifetime prevalence of this syndrome being 6.8% (21), the cited studies indicate that PTSD is a common chronic mental health problem following a virus disease with high mortality (22).

It should be added that COVID-19 infected persons most often develop less severe symptoms such as fever (78.8%), loss of smell and/or taste (from 19.0 to 73.6%), cough (53.9%) and malaise (37.9%), and sometimes diarrhea (9.5%), rhinitis (7.5%), and abdominal pain and vomiting (4.5%) (17, 23, 24) which are usually not life-threatening and are treated at home with over-the-counter medications. Infection may also be asymptomatic (25–27). Such cases are not likely to develop PTSD as COVID-19 infection in most of the cases does not lead to symptoms severe enough to be life threatening and these individuals do not meet the A criterion for PTSD (9). However, some persons, although not hospitalized, may experience severe symptoms of COVID-19 and fear of imminent death, thereby experiencing a traumatic event, and can develop PTSD; high levels of fear of death during

the event, not the type of medical treatment, are the hallmark of a traumatic stressor.

## Families of Severe COVID-19 Survivors and of Persons Who Died of the Disease

The second group at risk of developing pandemic-related PTSD are the families of people whose lives were at risk due to severe COVID-19 as well as the families of those who died of the disease under emergency circumstances. Being a witness to the threat to the life of another person, especially a loved one in the course of COVID-19, can be a traumatic event (9). The family's situation becomes even more complicated when a loved one has died in the course of the disease. Bereaved persons can then be obliged not only to deal with the traumatic events of life-threatening viral disease and the death of a loved one, but also with intense grief symptoms. The sudden death of a loved one and the inability to prepare for the death—which often occurs during a pandemic—is a risk factor for prolonged grief disorder (28). Grief of family members may be additionally difficult and complicated due to the circumstances surrounding death and mourning during a pandemic, e.g., quarantine of the dying persons, and delayed and very modest funerals. Grief and mourning in this time, due to accumulation of death and difficulties with recognizing individual bereavement and pain during pandemic, especially after loss of an elderly with chronic diseases, can be disenfranchising and therefore additionally complicated (29).

## Frontline Healthcare Workers

The third group at risk of developing PTSD during a pandemic are healthcare professionals who experience traumatic stress in the context of witnessing patients' dying and their lives being threatened, especially in cases of insufficient or inadequate intensive medical equipment. Furthermore, shortages of protective or medical equipment (30, 31) can be potentially traumatic if they lead the HCWs to fear of contamination and own imminent death. Own severe course of the disease and being a witness to the threat to life or death of other people may lead to the accumulation of traumatic stress in HCWs. Studies showed that after the SARS epidemic in 2002/2003, PTSD developed more often in infected HCWs than in non-HCWs (20, 32). We may predict that other professional groups such as employees of nursing homes and of other long-term care facilities also may experience some of these above mentioned traumatic stress factors (33).

## WHAT STEPS CAN BE TAKEN TO PREPARE FOR PANDEMIC-RELATED PTSD?

A systematic approach to services to prevent, diagnose, and treat PTSD in risk groups is needed (34). First of all, mental health experts should be aware of the risk of developing PTSD in severe COVID-19 survivors who feared imminent death from the disease, their family members and family members of patients who have died as a result of the pandemic, as well as frontline

HCWs witnessing patients' sudden deaths, or life-threatening situations. Information about PTSD and its symptoms should be made available to all HCWs and to mental health patients and their families during and in the months following the pandemic.

Second, we postulate that the three groups at risk described above should be routinely screened for PTSD in the months following the onset of the disease as the usual window of PTSD onset lies between 1 and 6 months after a traumatic event. Screening should be done in primary medical and pediatric care if resources are immediately available for timely follow-up by mental health professionals with specific expertise in PTSD assessment, and—in optimal circumstances—treatment of this disorder. Screening should distinguish between other mental health problems vs. PTSD. Measurement should begin with screening first for traumatic events, i.e., directly experiencing or witnessing death or imminent threat of death due to the pandemic (or other concurrent or previous incidents) being criterion A of the disorder according to DSM-5. PTSD symptoms should be screened only if potentially traumatic events are identified. For example, non-symptomatic individuals who test positive for COVID-19 are not at risk and should not be screened for PTSD, although they may develop other mental disorders such as depressive or anxiety disorder (35). Co-occurrence of PTSD and other disorders [see (7, 8)] is associated with high levels of distress, burden and reduced quality of life (11, 12), thus special clinical attention should be paid to individuals with PTSD experiencing additional mental health problems.

Bereaved surviving close ones who died unexpectedly as a result of the pandemic should be screened not only for PTSD but also for prolonged grief disorder, for example with the Prolonged Grief Disorder-13-Revised scale (36). PGD measurement should be carried out 12 months after the loss, as—according to DSM-5-TR—this is the time after which the persistence of severe grief symptoms, if they interfere with the psychosocial functioning, indicates the presence of this disorder (37).

Third, mental health services should prepare to provide evidence-based therapeutic interventions for individuals with PTSD such as prolonged exposure therapy, and cognitive processing therapy (38). It would be worth training clinicians in various countries in delivering these evidence-based interventions online, as well as to test their effectiveness in individuals with pandemic-related PTSD. Moreover, mental health professionals should be encouraged to: (i) share their experiences on the adjustments to be made in order to tailor these interventions to the current situation, e.g., necessity to provide interventions online and to acknowledge the specificity of the clinical picture of symptoms in severe COVID-19 survivors and their families (including the bereaved), and HCWs; (ii) define frameworks to effectively implement evidence-based interventions in mental health services in various countries (in particular in low income countries); and (iii) prepare accessible and easy-to-follow online trainings for professionals from various countries on evidence-based therapeutic interventions for PTSD.

Finally, studies indicate that the severity of PTSD symptoms in parents is associated with an increase in behavioral and emotional problems in their children (39, 40). Therefore, one should be



prepared to prevent such cascading effects of the pandemic by considering psychological support for children of parents who have developed PTSD due to the pandemic. Again, one of the challenges would be providing support for children and their families through online services.

The issue of the full prevalence of pandemic-related PTSD remains a matter of future research as symptoms may develop up to 6 months after the traumatic event. Research showing the full scope of pandemic-related PTSD prevalence will be possible only a few months after the end of the outbreak. Former studies indicated a large prevalence of PTSD in survivors of the earlier coronavirus epidemic (SARS), especially in HCWs, therefore we suggest that mental health professionals should prepare for the frequent occurrence of PTSD in this high risk groups. Families of survivors of severe diseases with high mortality and those who died from the pandemic, as well as frontline HCWs who were not infected but have witnessed numerous deaths and life-threatening situations—although not included in such systematic studies as survivors—may also experience traumatic stress during the outbreak and develop PTSD. Notwithstanding, we suggest that health care policies should consider routine screening for the presence of PTSD symptoms in the three groups at risk described in this paper,

together with preventive and treatment strategies of PTSD, and related risks such as suicide.

## AUTHOR CONTRIBUTIONS

MS wrote the first draft of the manuscript. All authors edited it, wrote parts of the reviewed manuscript, and accepted its final form.

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# Depressive State in the Emergency Department During COVID-19: A National Cross-Sectional Survey in China

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Chinese emergency department (ED) staff encountered significant mental stress while fighting the coronavirus disease 2019 (COVID-19) pandemic. We sought to investigate the prevalence and associated factors for depressive symptoms among ED staff (including physicians, nurses, allied health, and auxiliary ED staff). A cross-sectional national survey of ED staff who were on duty and participated in combating the COVID-19 pandemic was conducted March 1–15, 2020. A total of 6,588 emergency medical

personnel from 1,060 hospitals responded to this survey. A majority of respondents scored above 10 points on the PHQ-9 standardized test, which is associated with depressive symptoms. Those aged 31–45, those working in the COVID-19 isolation unit, and those with relatives  $\leq 16$  or  $\geq 70$  years old at home all had statistically significant associations with scoring  $> 10$  points. Depressive symptoms among Chinese emergency medical staff were likely quite common during the response to the COVID-19 pandemic and reinforce the importance of targeted ED staff support during future outbreaks.

**Keywords:** COVID-19, depression, emergency medicine, PHQ-9, China

## INTRODUCTION

At the end of December 2019, a new respiratory infection outbreak, later termed coronavirus disease 2019 (COVID-19), was first reported in Wuhan, China (1). Unfortunately, COVID-19 has continued to rampage throughout the world. According to the World Health Organization (WHO), there have already been hundreds of millions confirmed cases and several million deaths (2). The prevention and containment of COVID-19 have become issues of worldwide concern. Among a variety of control options, social distancing was recommended by the WHO to reduce the possibility of infection (3). Unfortunately, medical staff, particularly those on the frontlines of healthcare in emergency departments (EDs), have taken the brunt of the effort in the fight against COVID-19. They are unable to follow recommendations on social distancing and must work in areas that are high risk for COVID-19. According to data from the National Health Council of China, as of April 1, 2021, thousands of medical staff have been infected and many have died (4). ED staff are not only exposed to a higher risk of infection but also suffer the physical and mental strain of tiring work schedules, difficult triage decisions, fears of infecting family members, and the anguish of losing patients and colleagues to COVID-19 (5).

Previous studies showed that infectious disease pandemics, such as severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) can impact negatively on the mental health of different groups of people, including healthcare workers (6, 7). COVID-19 also likely results in psychological problems, such as stress, anxiety, and depressive symptoms, among frontline medical workers. Recently, several studies have reported that the prevalence of anxiety and depression among healthcare workers is higher during the COVID-19 pandemic (8, 9). However, research exploring the mental health problems of frontline medical workers in the ED is limited. The aim of this project was to examine the prevalence of depressive symptoms among ED medical personnel in China during the early (and most severe phase so far for China) of the COVID-19 pandemic.

## MATERIALS AND METHODS

### Study Design and Participants

This was a national cross-sectional survey conducted between March 1 and March 15, 2020. The study was approved by the Ethics Committee of Peking Union Medical College Hospital, and all participants provided informed consent. Chinese ED

staff (including physicians, nurses, allied health, and auxiliary ED staff) between 18 and 80 years of age who were on clinical duty in areas designated to receive COVID-19 patients between November 1, 2019, and March 15, 2020, were invited to participate. Only those able to complete informed consent were eligible for inclusion. Anyone previously diagnosed with any mental illness, those taking any antipsychotic medications, or those participating in other clinical trials were excluded. Due to the sudden outbreak of COVID-19 in China, some retired medical staff participated in the fight against the pandemic, so our study included medical staff over 60 years old (the normal retirement age in China). Finally, since nearly all ED staff on clinical duty in China during this period participated in fighting against the COVID-19 pandemic work, a concurrent control group of ED staff who did not participate in the fight against the pandemic was not feasible.

### Survey Instrument

Our survey instrument begins with collecting respondents' general characteristics, including sex, age, profession, relationship status, and whether they live with children younger than 16 years old or adults older than 70 years old.

We then queried respondents' work details during COVID-19. Specifically, we asked whether they worked in Hubei province (where the city of Wuhan is located, the site of the most significant COVID-19 outbreak in mainland China during the study period). During the pandemic, many medical staff across the country left their long-term work locations and went to Hubei to participate in fighting against the COVID-19 pandemic work, so we divided people working in Hubei into two groups: those who were living in Hubei for at least 2 years before the outbreak and those who went to Hubei to participate in anti-pandemic work. We also queried whether respondents worked in COVID-19 isolation wards, whether they were directly in contact with any confirmed COVID-19 patients (regardless of any protective measures being taken), whether they underwent compulsory isolation in their hospital due to workplace exposure to COVID-19 (i.e., they were being quarantined in the hospital facilities not due to being sick themselves), and the duration of such isolation time. We additionally clarified this issue in our research, by dividing the medical staff into "compulsory isolation in the hospital (i.e., they still needed to stay in the hospital when they are not at work)" and "non-compulsory isolation in the hospital (they could go home after work)."



We then asked respondents about the time spent working during the COVID-19 outbreak: what their working hours were before and after the outbreak of COVID-19 (including the average working hours of each rotation and weekly working hours). We collected the working hours of medical staff between November 2019 to March 2020 (the official “winter” months in China) and selected January 15, 2020, as date of the outbreak of China’s COVID-19 pandemic. January 15, 2020, was the infection point for COVID-19 cases in Wuhan (the average number of daily hospital admissions for fever jumped from 300 to 600 that day).

### Patient Health Questionnaire-9 (PHQ-9)

After the collection of respondent characteristics and work details, the Patient Health Questionnaire-9 (PHQ-9) standardized questionnaire was used to ascertain the psychological state of surveyed ED staff. The Patient Health Questionnaire depression module is a self-rated version of the Primary Care Evaluation of Mental Disorders Patient Questionnaire (PRIME-MD PQ) for depression (10, 11). PHQ-9 has been validated in two large studies involving 3,000 patients in seven obstetrics and gynecology clinics and another study with 3,000 patients in eight primary care clinics (12). This scale scores each of the nine diagnostic criteria for depression in the DSM-IV on a scale from “0” (not at all) to “3” (nearly every day) (12). The PHQ-9 is scored 0–27, with the interpretation based on the following intervals: 0–4, 5–9, 10–14, 15–19, and 20–27. The cutoff score for major depression symptoms in prior studies was set at 10, with subjects scoring higher than 10 being defined as having depressive symptoms. Using the Mental Health Professional (MHP) Validation Interviews as the criterion standard, a PHQ-9 score  $\geq 10$  had a sensitivity of 88% and a specificity of 88% for major depression (13), while a PHQ-9 score  $< 10$  yielded a negative predictive value of 0.99 (14). PHQ-9 has been widely applied in clinical institutions and scientific research to assist in making the diagnosis of depression, quantify depressive symptoms, and monitor their severity. We utilized the standard score of  $\geq 10$  as the critical value to divide those with or without a depressed state in this study. We hypothesized that most respondents would have a score  $> 10$ .

### Survey Process

In this study, we combined PHQ-9 with our own queries for respondent characteristics and work details as noted above. We then used an online questionnaire system (Gold Data, Jingshuo Technology Corporation, Beijing, China) as the platform for distributing our survey tool. We pushed out the survey instrument in an online “snowball” method of sampling by sending the survey out through friendship circles and promotion through emergency medicine groups on the WeChat messaging platform (Tencent Corporation, Shenzhen, China). The Gold Data system was then able to collect the survey data electronically.

### Statistical Analysis

Continuous variables were described with mean and standard deviation, while categorical variables were described by

frequency and percentages. When the distribution of a continuous variable was skewed, the median and interquartile ranges were presented. Student’s *T*-tests or one-way analysis of variance was employed for two groups or multiple-group continuous-measure comparisons, as appropriate. Chi-square tests were used for comparing categorical measures. Multiple logistic regression models were used to estimate the odds ratio (OR) and 95% confidence interval (CI) for the association between associated factors and depressive symptoms, with the risk factors selected by a forward stepwise method. All analyses were conducted using SAS version 9.2 (SAS Institute, Inc., Cary, NC, USA). A  $p < 0.05$  was considered statistically significant.

## RESULTS

We received 7,000 completed questionnaires through the online survey system, of which 6,588 (94.00%) were valid. Respondents came from 1,060 hospital EDs in 27 (out of a surveyed 31) provinces, autonomous regions, or independent municipalities in China. The average PHQ-9 score for all medical staff was  $10.94 \pm 5.1$ , and 3,795 out of 6,588 participants (57.60%) had a PHQ-9 score  $\geq 10$ . The prevalence of depressive symptoms was high with a PHQ-9 score distribution of 10–14 (34.44%), 15–19 (16.27%), and 20–27 (6.89%).

### Participant Characteristics

Participant characteristics are shown in **Tables 1, 2**. Among these samples, 33.58% were male and 66.42% were female. Most respondents (87.56%) were  $\leq 45$  years old. Among the medical staff surveyed, nurses and doctors accounted for 59.01 and 38.29%, respectively. Almost all (95.1%) participants were from outside of Hubei province during the COVID-19 outbreak. In addition, 56.70% of participants had children  $\leq 16$  years old at home who needed care, while 31.21% of participants lived with elderly family members  $\geq 70$  years old.

Almost half (45.86%) of the ED staff who participated in this study worked in their hospital’s COVID-19 isolation area(s), and 15.62% of them had direct contact with patients known to be infected with COVID-19. Almost all (92.93%) ED staff were forced to quarantine in their hospital while on service.

### Factors Associated With Major Depressive Symptoms Among ED Staff

Results of univariate analysis are shown in **Table 2**. Severe depressive symptoms divided by prevalence according to age group, occupation, and marital status were all statistically significant. In addition, the prevalence of PHQ-9 scores  $\geq 10$  was higher in males compared to females ( $p = 0.040$ ). Similar results were found in participants who lived with children  $\leq 16$  and adults  $\geq 70$ , those who worked in the COVID-19 isolation unit, and those who had direct contact with COVID-19 patients ( $p < 0.05$ ). There was no significant difference in the PHQ-9 scores between people who were or were not working in Hubei province during the outbreak.

**TABLE 1** | Participant characteristics.

Characteristic	Number (percent) ( <i>N</i> = 6,588)
<b>Gender</b>	
Male	2,212 (33.58%)
Female	4,370 (66.42%)
<b>Age (y)</b>	
18–30	2,713 (41.18%)
31–45	3,056 (46.38%)
46–60	798 (12.11%)
>60	21 (0.31%)
<b>Occupation</b>	
Medical	2,523 (38.29%)
Nurse	3,888 (59.01%)
Allied	150 (2.27%)
Auxiliary	27 (0.40%)
<b>Marital status</b>	
Married	4,665 (70.81%)
Single	1,770 (26.86%)
Divorced or widowed	153 (2.32%)
<b>Living with children ≤16 y of age</b>	
Yes	3,737 (56.72%)
No	2,849 (43.28%)
<b>Living with adult ≥70 y of age</b>	
Yes	2,056 (31.20%)
No	4,532 (68.80%)
<b>Working area in the COVID-19 period</b>	
Hubei province	325 (4.90%)
Other provinces	6,263 (95.10%)
<b>Working status in the COVID-19 period</b>	
Long-term work in Hubei	84 (1.20%)
Supporting Hubei work	241 (3.65%)
Work in other provinces	6,263 (95.15%)
<b>Working in the isolation unit with COVID-19 patients</b>	
Yes	3,021 (45.85%)
No	3,565 (54.11%)
<b>Direct contact with confirmed COVID-19 patients</b>	
Yes	1,029 (15.61%)
No	5,559 (84.38%)
<b>Compulsory isolation in hospital</b>	
Yes	6,122 (92.92%)
No	466 (7.08%)
<b>Distribution of PHQ-9 scores</b>	
0–4	547 (8.30%)
5–9	2,246 (34.09%)
10–14	2,269 (34.44%)
15–19	1,072 (16.27%)
20–27	454 (6.89%)

## Duty Time and Quarantine of the ED Staff

Among all respondents, the average time per duty rotation was 10 h, and the average time at work per week was nearly 50 h. There was no difference in the number of hours worked in Hubei

compared to other provinces (working hours per week,  $50.38 \pm 22.0$  vs.  $48.34 \pm 18.6$ ,  $p = 0.101$ ; working hours per rotation,  $11.78 \pm 8.0$  vs.  $11.89 \pm 7.6$ ,  $p = 0.799$ ). There was no difference in the average daily work hours per shift before or during the pandemic among respondents ( $11.88 \pm 7.4$  vs.  $11.89 \pm 7.6$ ,  $p = 0.850$ ). However, the average weekly work hours before COVID-19 were more than the average hours during COVID-19 ( $49.49 \pm 18.5$  vs.  $48.44 \pm 18.8$ ,  $p < 0.001$ ).

In our survey, the ED staff who were forced to quarantine in their hospital had a higher PHQ-9 score than those who were not forced into hospital isolation ( $11.4 \pm 4.9$  vs.  $10.9 \pm 5.1$ ,  $p = 0.0129$ ; **Table 2**). In addition, there was no statistically significant difference in scores between groups that had more or <14 quarantine days (PHQ score,  $11.63 \pm 5.1$  vs.  $11.359 \pm 4.8$ ,  $p = 0.970$ ).

## Factors Associated With Depressive Symptoms by Multivariate Analysis

As shown previously, univariate analysis (**Table 2**) revealed several variables associated with a PHQ-9 score  $\geq 10$ . Subsequent multiple logistic regression analysis showed that a score  $\geq 10$  during the COVID-19 pandemic was significantly associated with direct contact with confirmed COVID-19 patients (OR = 1.153, 95% CI: 0.994–1.338), working in the COVID-19 isolation unit (OR = 1.366, 95% CI: 1.23–1.517), respondents between 31 and 45 years of age (OR = 1.139, 95% CI: 1.004–1.293), and those staff living with children  $\leq 16$  years old (OR = 1.126, 95% CI: 1.001–1.267) or adults  $\geq 70$  years old (OR = 1.325, 95% CI: 1.177–1.492). Results of the multivariate logistic regression analysis are shown in **Table 3**.

## DISCUSSION

This was a large-scale, multicenter, cross-sectional study of the prevalence and risk factors for depression among medical staff during the COVID-19 pandemic. Because the population surveyed in this study covered most provinces and cities in China, we can draw a relatively complete picture of the prevalence of depressive symptoms among Chinese ED staff during the fight against the COVID-19 pandemic. The results of this study show that more than half of all staff surveyed experienced PHQ-9 scores  $\geq 10$ , and such elevated scores were associated with age, family factors, and exposure to COVID-19 patients and were independent of work time or location. These results offer a comprehensive national assessment of potential depressive state in ED staff that may be used to guide future mental health improvement efforts.

Many recent psychological investigations on health professionals during COVID-19 have shown that health professionals fighting COVID-19 are suffering from more psychiatric disorders than other occupational groups (8, 15, 16). Wang et al. (17) performed a survey of Chinese physicians in Liaoning province and found that the prevalence of depressive symptoms among doctors was 65.3%. Lai et al. (8) performed a multicenter cross-sectional survey which collected demographic data and mental health measures of 1,257 health professionals

**TABLE 2** | Univariate analysis results between the PHQ-9 < 10 and PHQ-9 ≥ 10 groups.

Characteristic	Overall (N = 6,588)	Overall PHQ score Mean ± SD	PHQ-9 < 10 (N = 2,793) N (%)	PHQ-9 ≥ 10 (N = 3,795) N (%)	P-value*
<b>Gender</b>					
Male	2,212	11.2 ± 5.3	899 (40.64%)	1,313 (59.36%)	0.0396
Female	4,370	10.8 ± 5.0	1,892 (43.30%)	2,478 (56.70%)	
<b>Age (y)</b>					
18–30	2,713	10.3 ± 4.9	1,268 (46.74%)	1,445 (53.26%)	
31–45	3,056	11.3 ± 5.2	1,200 (39.27%)	1,856 (60.73%)	< 0.0001
46–60	798	11.4 ± 5.3	312 (39.10%)	486 (60.90%)	
>60	21	9.7 ± 7.0	13 (61.90%)	8 (38.10%)	
<b>Occupation</b>					
Medical	2,523	11.4 ± 5.3	981 (38.88%)	1,542 (61.12%)	< 0.0001
Nurse	3,888	10.7 ± 5.0	1,714 (44.08%)	2,174 (55.92%)	
Allied	150	9.5 ± 5.3	82 (54.67%)	68 (45.33%)	
Auxiliary	27	9.2 ± 5.0	16 (59.26%)	11 (40.74%)	
<b>Marital status</b>					
Married	4,665	11.1 ± 5.1	1,899 (40.71%)	2,766 (59.29%)	< 0.0001
Single	1,770	10.5 ± 4.9	830 (46.89%)	940 (53.12%)	
Divorced or widowed	153	11.5 ± 5.9	64 (41.83%)	89 (58.17%)	
<b>Living with children ≤16 y of age</b>					
Yes	3,737	11.3 ± 5.2	1,475 (39.47%)	2,262 (60.53%)	< 0.0001
No	2,849	10.5 ± 4.9	1,317 (46.23%)	1,532 (53.77%)	
<b>Living with adult(s) ≥70 y of age</b>					
Yes	2,056	10.6 ± 4.9	740 (35.99%)	1,316 (64.01%)	< 0.0001
No	4,532	11.8 ± 5.3	2,053 (45.30%)	2,479 (54.70%)	
<b>Working area</b>					
Hubei province	325	10.2 ± 5.1	153 (47.08%)	172 (52.92%)	0.0798
Other provinces	6,263	11.0 ± 5.1	2,640 (42.15%)	3,623 (57.85%)	
<b>Working status</b>					
Long-term work in Hubei	84	11.1 ± 5.4	35 (41.67%)	49 (58.33%)	0.1094
Supporting Hubei work	241	9.9 ± 4.9	118 (48.96%)	123 (51.04%)	
Work in other provinces	6,263	11.0 ± 5.1	2,640 (42.15%)	3,623 (57.85%)	
<b>Working in the isolation unit with COVID-19 patients</b>					
Yes	3,021	11.6 ± 5.3	1,134 (37.54%)	1,887 (62.46%)	< 0.0001
No	3,565	10.3 ± 4.8	1,658 (46.51%)	1,907 (53.49%)	
<b>Direct contact with confirmed COVID-19 patients</b>					
Yes	1,029	11.6 ± 5.2	385 (37.41%)	644 (62.59%)	0.0004
No	5,559	10.8 ± 5.1	2,408 (43.32%)	3,151 (56.68%)	
<b>Compulsory isolation in hospital</b>					
Yes	6,122	11.4 ± 4.9	2,621 (42.81%)	3,501 (57.19%)	0.0129
No	466	10.9 ± 5.1	172 (36.91%)	294 (63.09%)	

\*  $\chi^2$  test.

that treat patients exposed to COVID-19 in China, and they reported that 50.4% showed symptoms of depression. The rate of depressive state (PHQ-9 score ≥ 10) was 57.60% in our study. The proportion of people with depressive symptoms is slightly higher than the results of previous studies. One possible reason for this is that our study included only ED staff, whereas participants in other studies were from a variety of other specialties (e.g., respiratory medicine, critical care medicine, other internal

medicine specialties, or anesthesia). In China, medical staff in the ED have often already experienced high levels of stress even before COVID-19 began due to heavy workloads under uncertain conditions.

In most previous studies on the psychological impact of the COVID-19 pandemic on frontline healthcare workers, female nurses with close contact with COVID-19 patients appeared to have the highest mental health risks (18–21). It is important

**TABLE 3** | Factors associated with depressive symptoms by multivariate analysis.

	Coefficients	SE*	Statistics**	P-value	OR <sup>†</sup>	95% CI <sup>‡</sup>
Direct contact with confirmed COVID-19 patients	0.142	0.0758	3.5206	0.0606	1.153	0.994–1.338
Working in the isolation unit with COVID-19 patients	0.312	0.0534	34.1538	<0.0001	1.366	1.23–1.517
Age between 18 and 30 years old	Ref					
Age between 31 and 45 years old	0.130	0.0645	4.0756	0.0435	1.139	1.004–1.293
Age between 46 and 60 years old	0.054	0.0935	0.333	0.5639	1.055	0.879–1.268
Age above 60 years old	−0.834	0.4593	3.2987	0.0693	0.434	0.176–1.068
living with children ≤16 y of age	0.1189	0.0599	3.936	0.0473	1.126	1.001–1.267
Living with adult ≥70 y of age	0.2818	0.0604	21.7272	<0.0001	1.325	1.177–1.492

\*Standard error of estimated coefficients.

\*\* $\chi^2$  statistics.

<sup>†</sup>Odds ratio.

<sup>‡</sup>95% confidence interval for odds ratio.

to note that most previous studies included predominantly female participants, particularly nurses. Like the population composition of most previous studies, female participants also accounted for most of the population in our survey, but male respondents on average had higher PHQ-9 scores than female respondents. While the reasons behind this result are still unclear, this does help illustrate that female respondents do not have a monopoly on depression. Among other factors related to depressive symptoms among the ED staff surveyed, our correlation analysis indicated that a younger age and a married marital status were associated with depression. These predictors were mostly consistent with previous research (22, 23). The 31–45-year-old age group accounted for the largest proportion of subjects as well as the subgroup with the highest PHQ-9 scores. Compared with younger doctors, senior medical staff with more work experience may have more experience dealing with complex situations, which could explain their lower perceived stress and better resilience (24).

Isolation for ED staff during the COVID-19 outbreak was an additional stressor for frontline medical staff. During the COVID-19 period, the Chinese government strongly recommended that everyone reduce travel and self-quarantine as much as possible in their current place of residence, so it can be difficult to clearly define any additional “compulsory” element of isolation. In this study, we further divided any isolating ED staff into those who reported “compulsory isolation” in their hospital (they needed to remain on hospital property even when they are not on duty) and “non-compulsory isolation” outside of their hospital (they could go home after work). Isolation and confinement during the epidemic could cause a loss of daily habits, reduce socialization with other people, and directly lead to boredom and depression (25). ED staff who were not isolated in the hospital could still live at home, communicate with family and friends, and continue to receive their family’s emotional support and encouragement. In addition, ED staff who were forced to be isolated at their hospital may be in close contact with infected patients, thereby aggravating social stigma. In our study, the average PHQ-9 score and the proportion of PHQ-9 scores  $\geq 10$  were indeed higher in those ED staff who had to isolate in the hospital compared to those who could go home after work.

Surprisingly, compared with those inside Hubei province, those outside of Hubei province had no significant difference in PHQ-9 scores, this is different from the results of other cross-sectional studies during the same period, which showed that medical staff deployed to Hubei province had a higher prevalence of depressive symptoms than physicians and nurses working in fever clinics and infectious disease wards outside of Hubei province (8, 22, 26–28). During the outbreak of COVID-19, physicians and nurses deployed to Hubei province had to face confirmed COVID-19 patients. They had to work in unfamiliar environments, the patients they saw every day were more critical, and many of them needed immediate care (26, 27). In our study, ED medical personnel working in Hubei made up a relatively small portion (4.93%) of the overall study population, and this may prevent a meaningful analysis of their risk profile, being a limitation to the present study. Working in Wuhan was associated with more stress, but statistical significance was not met, possibly due to an insufficient sample size.

Looking at duty hours, we found that, regardless of the pandemic, the average working hours of all Chinese ED staff are relatively long. The average shift is 12 h long, and the average work hours per week are close to 50 h. High-intensity and time-consuming work may cause medical staff to become fatigued, resulting in higher overall PHQ-9 scores.

During the COVID-19 outbreak, there was no difference in both the number of duty hours per day and the number of duty hours per week in different regions (including Hubei province). This indicates that even though Hubei was the epicenter in China’s fight against the pandemic and there were more COVID-19 patients there than in other provinces, there seems to have been no serious imbalance in work hours compared to elsewhere in China. In addition, the duty hours for staff in other provinces did not decrease either. The number of medical staff in other provinces may have declined due to transfers to Hubei, but, due to fewer ED cases throughout the country, the remaining workers seemed to be on duty about the same amount of time. The workload of first-line medical staff in provinces other than Hubei should therefore not be minimized.

In a related point, the total number of work hours per week for ED staff was less after the COVID-19 outbreak than before.



There are many reasons for this, including additional medical staffing support from other departments, thereby reducing the average work hours for emergency medicine staff. National policy required medical staff who worked in the COVID-19 isolation ward(s) to have 14 days of compulsory isolation, which may also have reduced the average number of hours worked. During the COVID-19 period, the number of patients with fever increased significantly compared to previous years, and the number of patients who went to the hospital for other diseases was much smaller than usual. Similar situations have been reported in other regions. For example, from February 1 to April 30, 2020, the number of ED patients in Hong Kong decreased by 37% (28).

Our study had several limitations. First, like other screening questionnaires, the PHQ-9 scale is not sufficiently accurate to establish a definitive diagnosis of major depression. Scores exceeding the threshold are, in effect, a positive screen which should prompt a careful mental health assessment. Even though a score  $\geq 10$  does not equal major depression, high score may lead to other diagnoses that share symptoms with major depression, such as anxiety disorder, alcohol use disorder, or subsyndromal depression. Second, although we have obtained correlations for many single-factor analyses, many variables related to depression have not yet been explored. The correlation between different variables requires the creation of a comprehensive variable, which can be directly linked to the PHQ-9 score. Finally, this was a cross-sectional study and cannot directly establish the relationship between depression and related factors.

In conclusion, our study showed that most Chinese ED staff who worked clinically during the response to COVID-19 had elevated PHQ-9 scores which put them at a very high risk for major depression. This is the first comprehensive study to explore

the prevalence and associated factors of depression among emergency medicine workers in Chinese EDs. Policymakers should implement appropriate proactive interventions for ED staff in times of extreme distress, either during COVID-19 outbreaks or during future pandemics.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of Peking Union Medical College Hospital. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

SL and XY contributed to the study design. SL, CZ, XL, QX, JW, XDZ, DL, SN, LL, ZL, MZ, XCZ, QGX, JLS, PP, YC, WY, HZ, YD, LY, BD, CQ, JL, GZ, QD, and YT contributed to the data collection. QW, XH, MW, HL, XG, LC, YF, YXW, JH, JC, WM, SQ, YGC, YJ, YJW, YXH, JJS, JLW, DZ, RH, ZX, YYH, and DY contributed to the data entry. HDZ, JX, YL, and XY contributed to study monitoring. SL, WH, and CS contributed to the data interpretation and analysis. SL and CS contributed to the literature search. SL, CS, XMZ, and JHW contributed to the writing. All the authors read and approved the final version of the manuscript.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Prevalence and Risk Factors of Mental Health Problems Among Healthcare Workers During the COVID-19 Pandemic: A Systematic Review and Meta-Analysis

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**Objective:** The purpose of this meta-analysis was to summarize the prevalence and risk factors of mental health problems among healthcare workers during the COVID-19 pandemic.

**Methods:** We applied an optimized search strategy across the PubMed, EMBASE, Scopus, PsycINFO, and four Chinese databases, with hand searching supplemented to identify relevant surveys. Studies were eligible for inclusion if they were published in peer-reviewed literature and used a validated method to assess the prevalence and risk factors of mental health problems among healthcare workers during the COVID-19 pandemic. Heterogeneity was quantified using  $Q$  statistics and the  $I^2$  statistics. The potential causes of heterogeneity were investigated using subgroup analysis and meta-regression analysis. Sensitivity analysis was performed to examine the robustness of the results.

**Results:** We pooled and analyzed data from 20 studies comprising 10,886 healthcare workers. The prevalence of depression, anxiety, insomnia, post-traumatic stress symptoms, phobia, obsessive-compulsive symptoms, and somatization symptoms was 24.1, 28.6, 44.1, 25.6, 35.0, 16.2, and 10.7%, respectively. Female and nurses had a high prevalence of depression and anxiety. Frontline healthcare workers had a higher prevalence of anxiety and a lower prevalence of depression than the those in the second-line. Furthermore, the proportion of moderate-severe depression and anxiety is higher in the frontline. Additionally, four studies reported on risk factors of mental health problems.

**Conclusions:** In this systematic review, healthcare workers have a relatively high prevalence of depression, anxiety, insomnia, post-traumatic stress symptoms, phobia, obsessive-compulsive symptoms, and somatization symptoms during the COVID-19 pandemic, and focus should be on the healthcare workers at high risk of mental problems. Mental health problems in healthcare workers should be taken

seriously, and timely screening and appropriate intervention for the high-risk group are highly recommended.

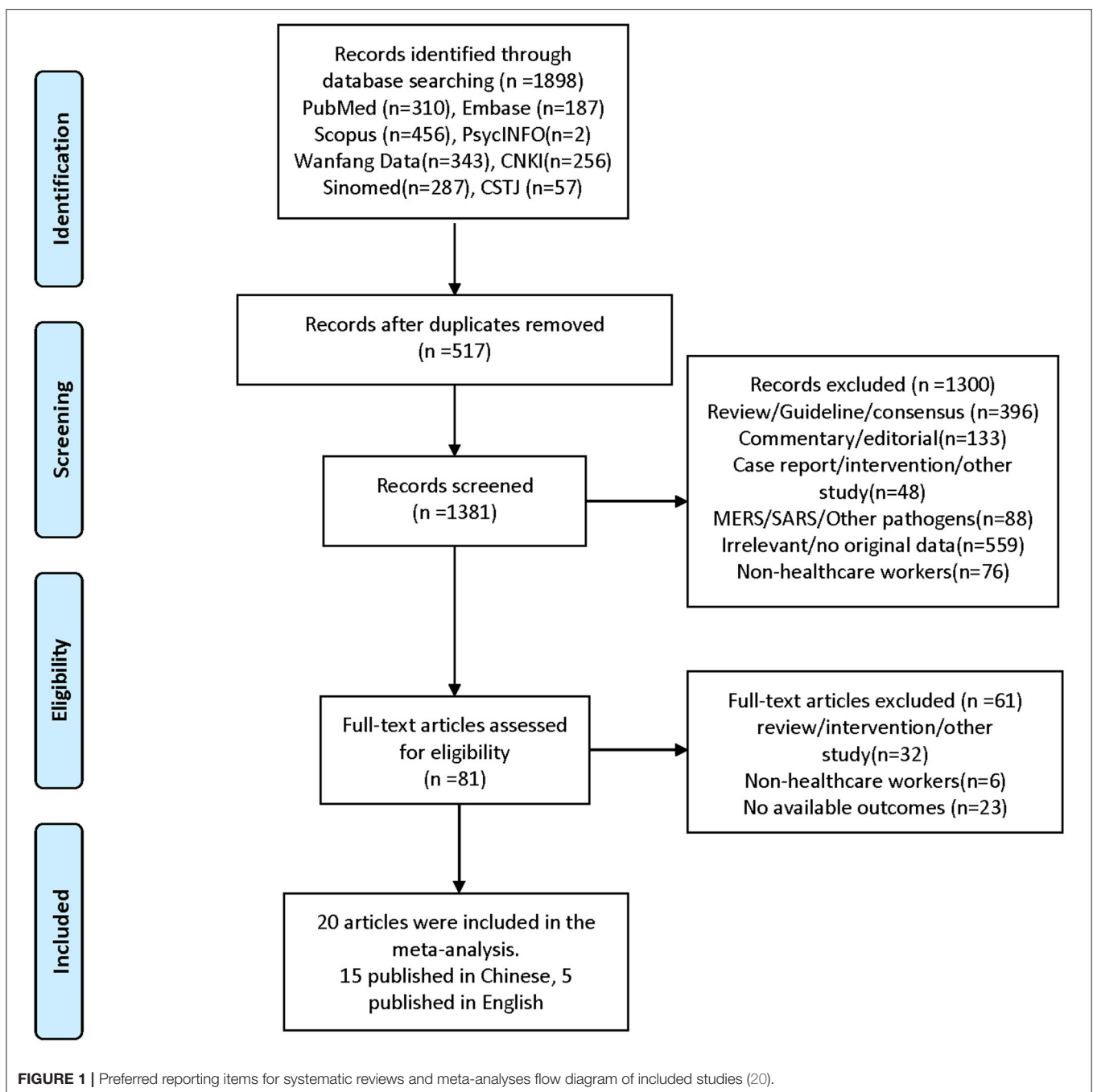
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**Keywords:** coronavirus disease, healthcare workers, mental health, prevalence, risk factors, meta-analysis

## INTRODUCTION

At the end of 2019, an emerging infectious disease named coronavirus disease 2019 (COVID-19) caused by severe acute

respiratory syndrome coronavirus 2 (SARS-CoV-2) broke out and caused a global pandemic that put healthcare workers (HCWs) across the world under unprecedented challenges and huge psychological impact (1, 2). In the fight against COVID-19,





**TABLE 1** | Characteristics of the included studies in this systematic review and meta-analysis.

ID	References	Country	Age, years (mean ± SD)/%	Total number	No. of female	No. of HCWs	Survey method	Population	Instrument	Start date	End date	Position	Sampling method	AHRQ checklist
1	Cai and Qin (27)	China	32.48 ± 2.03	48	37	48	Unknown	Hospital-Based	SCL-90	Unknown	7-Feb	First line	Unknown	4 yes
2	Cao et al. (28)	China	32.8 ± 9.6	37	29	37	Unknown	Hospital-Based	PHQ-9	Unknown	26-Feb	First line	Cluster	4 yes
3	Duan et al. (29)	China	32.82 ± 6.41	642	506	530	Online survey	Hospital-Based	PHQ-9, GAD-7	14-Feb	16-Feb	Mixed	Unknown	4 yes
4	He et al. (30)	China	38.7 ± 6.3	360	141	256	Online survey	Population-Based	PSQI	24-Jan	2-Mar	First line	Unknown	4 yes
5	Huang et al. (31)	China	32.6 ± 6.2	230	187	230	Online survey	Hospital-Based	SAS, PTSD-SS	7-Feb	14-Feb	First line	Cluster	4 yes
6	liu et al. (32)	China	29.00 ± 5.88	1,097	1,078	1,097	Online survey	Hospital-Based	PHQ-9, GAD-7, ISI-7, SQR-20	1-Feb	18-Feb	Second line	Unknown	5 yes
7	Lai et al. (15)	China	<40 (80.5%)	1,257	964	1,257	Unknown	Hospital-Based	PHQ-9, GAD-7, ISI-7, IES-R	29-Jan	3-Feb	Mixed	Cluster	7 yes
8	Li et al. (33)	China	>30 (46.6%)	205	175	205	Online survey	Hospital-Based	PCL-C	8-Feb	11-Feb	First line	Convenience	6 yes
9	Lu et al. (17)	China	<40 (78%)	2,299	1,785	2,042	Unknown	Hospital-Based	HAMD, HAMA	25-Feb	26-Feb	Mixed	Unknown	6 yes
10	Qi et al. (34)	China	≤40 (79%)	400	295	400	Unknown	Hospital-Based	SDS, SAS	Unknown	5-Feb	First line	Convenience	4 yes
11	Sun et al. (35)	China	<40 (97.3%)	110	102	110	Unknown	Hospital-Based	SCL-90	Unknown	25-Feb	First line	Unknown	3 yes
12	Tan et al. (36)	Singapore	31 (32, 34–41)	470	321	296	Unknown	Hospital-Based	DASS-21, IES-R	19-Feb	13-Mar	First line	Unknown	6 yes
13	Tang et al. (16)	China	33.6 ± 6.39	44	34	44	Unknown	Hospital-Based	SDS, SAS, PSS-10	Unknown	Unknown	First line	Convenience	4 yes
14	Wu et al. (42)	China	30.84 ± 4.52	106	85	106	Online survey	Hospital-Based	SAS, PSQI	Unknown	2-Feb	First line	Convenience	5 yes
15	Xiao et al. (41)	China	<40 (84.3%)	423	293	423	Online survey	Hospital-Based	SDS, SAS	6-Feb	8-Feb	Second line	Random	5 yes
16	Xu and Zhang (40)	China	31.28 ± 2.53	41	37	41	Online survey	Hospital-Based	SCL-90	Unknown	29-Jan	First line	Cluster	4 yes
17	Xu et al. (39)	China	34.79 ± 7.14	360	291	360	Online survey	Hospital-Based	SDS, SAS	7-Feb	15-Feb	Second line	Unknown	5 yes
18	Ye et al. (43)	China	≤35 (67.8%)	2,104	1,644	2,104	Online survey	Hospital-Based	GAD-7	29-Jan	5-Feb	Mixed	Convenience	6 yes
19	Zhang et al. (38)	China	18–60 (96.3%)	2,182	678	927	Online survey	Population-Based	PHQ-2, GAD-2, ISI-7, SCL-90-R	19-Feb	6-Mar	Mixed	Unknown	8 yes
20	Zheng et al. (37)	China	<46 (87.5%)	373	278	373	Online survey	Hospital-Based	PHQ-9	18-Feb	21-Feb	Mixed	RS	4 yes

HCWs, healthcare workers; PHQ-9, nine-item Patient Health Questionnaire; DASS-21, 21-item Depression, Anxiety, and Stress Scale; SDS, Zung Self-Rating Depression Scale; HAMD, Hamilton Depression Scale; GAD-7, seven-item Generalized Anxiety Disorder; SAS, Zung Self-Rating Anxiety Scale; HAMA, Hamilton Anxiety Scale; ISI-7, seven-item Insomnia Severity Index; PSQI, Pittsburgh Sleep Quality Index; SQR-20, Self-Reporting Questionnaires; IES-R, Impact of Event Scale—Revised; PCL-C, PTSD Checklist—Civilian Version; PTSD-SS, Post-traumatic Stress Disorder Self-Rating Scale; SCL-90, Symptom Checklist 90; SCL-90-R, Symptom Checklist 90—Revised; AHRQ Checklist, The Agency for Healthcare Research and Quality Methodology Checklist.

HCWs played a leading role. The HCWs were in the vanguard of the battle to combat COVID-19, providing medical services to the most affected areas (3). The mental health of HCWs was greatly challenged during the Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS) (4–7). As generally known, COVID-19 is more contagious than SARS and MERS (8, 9) and can bring HCWs on the frontline mental health problems (10–14). Similarly, during the COVID-19 pandemic, HCWs encountered a huge psychological burden, with a high prevalence of depression, anxiety, insomnia, and distress (15, 16). Moreover, frontline HCWs, in fighting COVID-19, have more severe degrees of mental health symptoms than other HCWs (15, 17). Beyond the effects of mental health problems on individuals, the mental health problems of HCWs may link to poor-quality patient care and increased medical errors (18, 19). A reliable estimate of the prevalence of mental health problems among HCWs during the COVID-19 pandemic is of vital importance to its prevention, identification, and treatment. To the best of our knowledge, there has not been a meta-analysis of the prevalence of mental health problems and risk factors among HCWs during the COVID-19 pandemic published in the literature. We conducted a systematic review and meta-analysis of the prevalence of mental health problems and risk factors among HCWs during the COVID-19 pandemic to identify at-risk HCWs and provide timely assistance and intervention.

## METHODS

### Protocol

The protocol of our study has been registered on the International Prospective Register of Systematic Reviews (PROSPERO, CRD42020179189). The review methods are described in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines (20) and the Meta-analysis of Observational Studies in Epidemiology criteria (21).

### Search Strategy and Study Eligibility

The search was performed in all fields in the PubMed, EMBASE, Scopus, PsycINFO, and four Chinese databases, including Chinese Biomedical Literature Database, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Wanfang database, with no language restrictions, from January 1, 2020 (subsequent to the emergence of COVID-19 in China) to April 14, 2020. The detailed search terms and full strategies are available in **Supplementary Material 1**. Additionally, a manual search was performed by reviewing the reference lists of the related articles by two investigators. Where necessary, we contacted the authors for any additional data.

Population-based or hospital-based studies fulfilling the following criteria were included in the present analysis: (1) the HCWs including doctors, nurses, and other medical personnel who were directly or indirectly involved in the diagnosis, treatment, or care of patients with confirmed or suspected cases of COVID-19, (2) studies reported the prevalence or risk factors of mental health problems (depression, anxiety, insomnia, etc.)

among HCWs which were assessed by structured interviews or validated questionnaires, (3) cross-sectional or cohort studies, and (4) published in a peer-reviewed journal.

Studies without original data and studies in which the data could not be reliably extracted after corresponding with the authors were excluded. If the same sample was reported in more than one study, the larger sample size with the longest follow-up duration will be included.

### Data Extraction and Quality Assessment

Two authors independently extracted the data, reported by the selected articles, and documented the following details in a standardized table: general information of publication (first author, year and location of the study, study period, and language), study design (cohort or cross-sectional), survey method, sampling method, study sample origin (population-based or hospital-based), sample size, number of HCWs, number of female HCWs, number of mental health problems among HCWs, instrument used to assess mental health problems, risk factors of each mental health problem, and the effects of each risk factor. The methodological quality of the included cross-sectional studies was assessed using an 11-item checklist which was recommended by the Agency for Healthcare Research and Quality (AHRQ). The answer to each item is “no,” “unclear,” and “yes,” respectively. Study quality was defined as follows: low quality (0–3 yes), moderate quality (4–7 yes), and high quality (8–11 yes). Any discrepancies will be resolved by consensus, and if necessary, a third reviewer will be consulted to arbitrate.

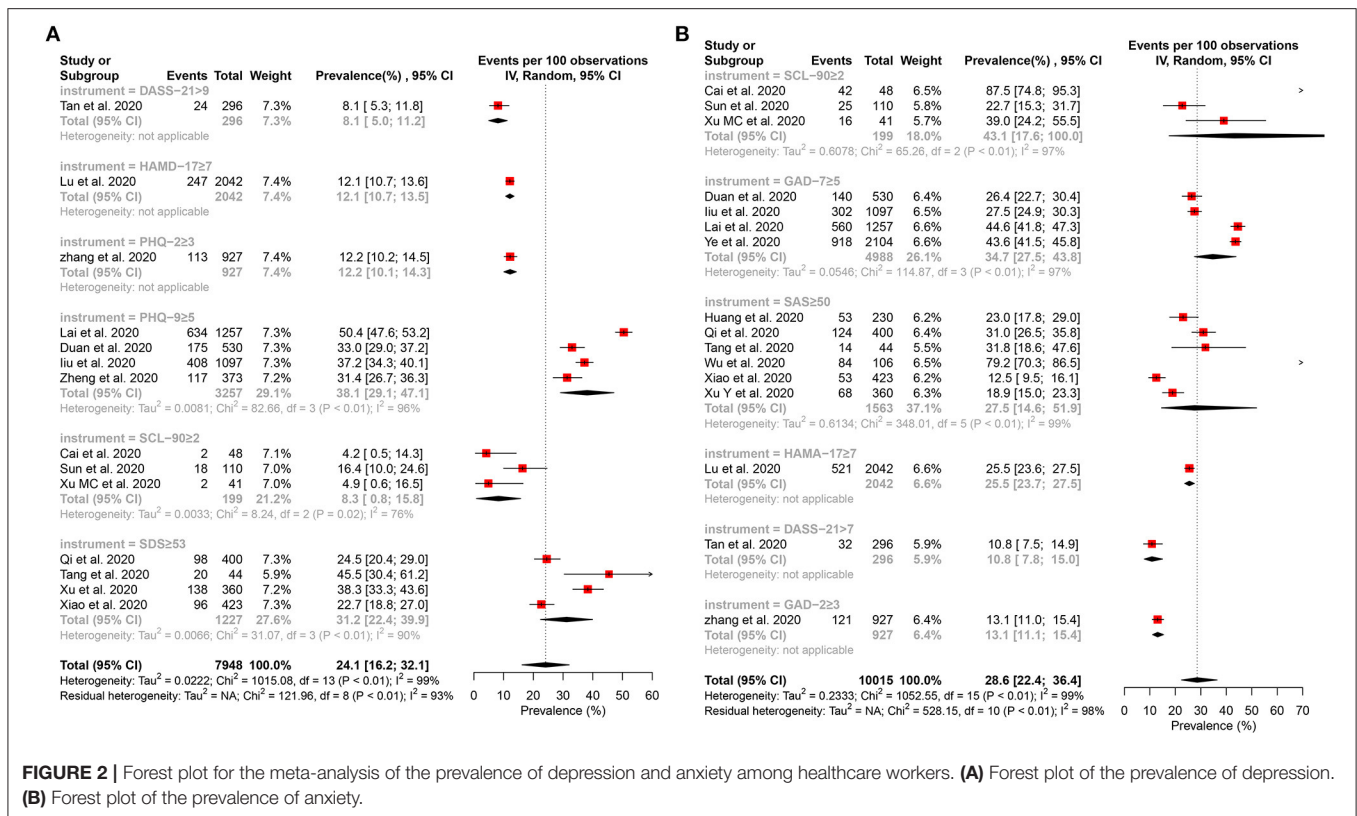
### Data Synthesis and Analysis

The pooled prevalence of each mental health problem and its 95% confidence intervals (CI) were calculated using random-effects meta-analysis that accounted for the heterogeneity of studies (22). The heterogeneity of studies was assessed by  $Q$ -test and  $I^2$ .  $I^2 > 50\%$  and  $p < 0.05$  in the  $Q$ -test were interpreted as the presence of significant heterogeneity (23, 24). When significant heterogeneity was identified, the source of heterogeneity was explored by subgroup analysis and meta-regression. Subgroup analyses were conducted with stratification by sample size, staff type, position, and gender. Sensitivity analysis using the leave-one-out method was performed to examine the robustness of the results. The potential publication bias was evaluated by funnel plot and the Egger linear regression test (25, 26). The statistical tests were two-sided and used a significance threshold of  $P < 0.05$ . We performed the statistical analysis in R (version 4.0.0; <https://www.r-project.org/>). A systematic narrative synthesis will be conducted if it is impossible to handle any meta-analysis.

## RESULTS

### Study Characteristics

According to the search strategy, a total of 1,898 records were retrieved, and 20 records were finally included (**Figure 1**). All studies were of a cross-sectional design, involving a total of 10,886 HCWs in 12,788 individuals for the quantitative synthesis; 70% of all participants were women, and 80% of the



**FIGURE 2 |** Forest plot for the meta-analysis of the prevalence of depression and anxiety among healthcare workers. **(A)** Forest plot of the prevalence of depression. **(B)** Forest plot of the prevalence of anxiety.

research were completed by February 2020. Nineteen studies took place in China, plus one in Singapore. Five studies were published in English, and the remaining 15 studies were published in Chinese. The median of participants per study was 639 (range, 37–2,299). Various instruments were utilized. For depression, the most commonly used tools were the Zung Self-Rating Depression Scale, the nine-item Patient Health Questionnaire, the Symptom Checklist-90 (SCL-90), and the 21-item Depression, Anxiety, and Stress Scale (DASS-21). For anxiety, the Zung Self-Rating Anxiety Scale, the SCL-90, and the seven-item Generalized Anxiety Disorder were used. For insomnia, the seven-item Insomnia Severity Index and the Pittsburgh Sleep Quality Index were used. For post-traumatic stress symptoms (PTSS), the Post-traumatic Stress Disorder Self-Rating Scale (PTSD-SS), the Impact of Event Scale—Revised version (IES-R), and the PTSD Checklist—Civilian version (PCL-C) were used. Obsessive-compulsive symptoms, somatization symptoms, and phobia were assessed by the SCL-90 and the 90-item Symptom Checklist—Revised. Eleven studies included frontline HCWs only, six included both frontline and second-line HCWs, and three included second-line HCWs only. When evaluated by the AHRQ assessment criteria, one study received eight points, one received seven points, four received six points, four received five points, nine received four points, and one received three points. Most studies are of moderate quality, with methodological quality scores ranging from 4 to 7. The detailed characteristics of the included studies are shown in **Table 1**.

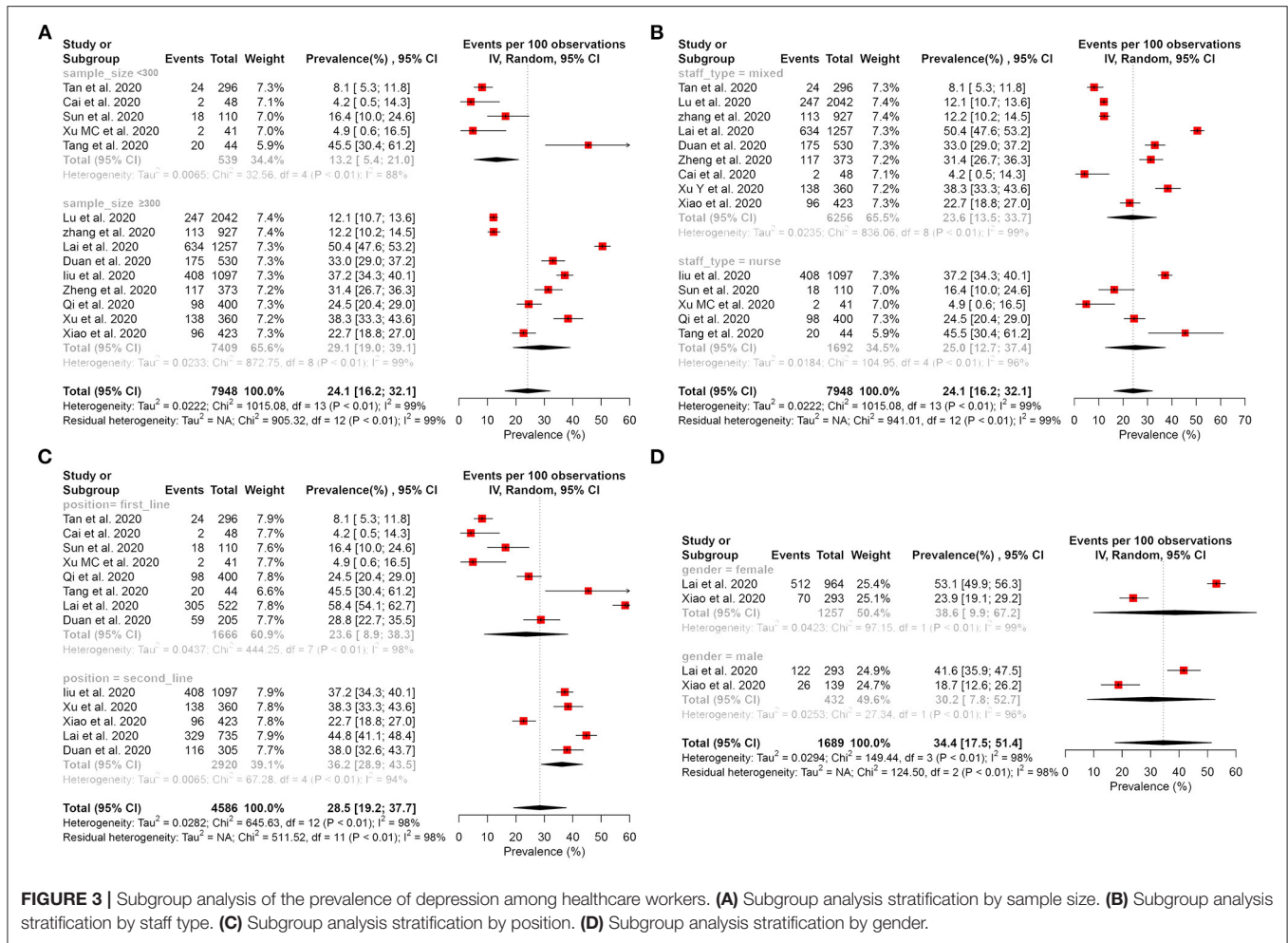
## Prevalence of Mental Health Problems in HCWs

### Prevalence of Depressive Symptom

Fourteen studies (15–17, 27–29, 32, 34–41) reported that the pooled prevalence of depressive symptom among HCWs was 24.1% (95% CI: 16.2–32.1%,  $I^2 = 99%$ ,  $P < 0.01$ ), with a range from 4.2 to 50.4% (**Figure 2A**). A subgroup analysis revealed that the second-line HCWs (36.2%, 95% CI: 28.9–43.5%,  $I^2 = 94%$ ,  $P < 0.01$ ) and female HCWs (38.6%, 95% CI: 9.9–67.2%,  $I^2 = 99%$ ,  $P < 0.01$ ) had a higher prevalence of depression symptom than frontline and male HCWs separately (**Figure 3**). About 9.6% of HCWs were identified by instruments as individuals with moderate to severe depression (**Figure 4A**). Among them, the prevalence of moderate to severe depression in frontline HCWs (14.6%, 95% CI: 6.3–23.0%,  $I^2 = 91%$ ,  $P < 0.01$ ) is higher than those in the second-line (8.7%, 95% CI: 3.9–13.4%,  $I^2 = 94%$ ,  $P < 0.01$ ; **Figure 4B**).

### Prevalence of Anxiety Symptom

Sixteen studies (15–17, 27, 29, 31, 32, 34–36, 38–43) reported that the pooled prevalence of anxiety among HCWs was 28.6% (95% CI: 22.4–36.4%,  $I^2 = 99%$ ,  $P < 0.01$ ), with a range from 10.8 to 87.5% (**Figure 2B**). In the subgroup analysis stratified by position, the frontline HCWs (33.5%, 95% CI: 23.5–47.7%,  $I^2 = 98%$ ,  $P < 0.01$ ) had a higher prevalence of anxiety than the second-line HCWs (**Figure 5C**). Of the 16 studies, seven studies reported that the prevalence of anxiety is higher in nurses (36.8%, 95% CI: 26.8–50.5,  $P < 0.001$ ) than that in the mixed staff



**FIGURE 3 |** Subgroup analysis of the prevalence of depression among healthcare workers. (A) Subgroup analysis stratification by sample size. (B) Subgroup analysis stratification by staff type. (C) Subgroup analysis stratification by position. (D) Subgroup analysis stratification by gender.

type including nurses and doctors (Figure 5B). In the subgroup stratified by gender, female HCWs (26.6%, 95% CI: 13.1–53.9%,  $I^2 = 98\%$ ,  $P < 0.01$ ) had a higher prevalence of anxiety than male HCWs (Figure 5D). About 7.2% of HCWs were identified by instruments as individuals with moderate to severe anxiety (Figure 6A). Similar to the symptoms of depression, the anxiety symptoms of frontline HCWs are more severe than that of the second-line HCWs (Figure 6B).

### Prevalence of Insomnia

Five studies (15, 30, 32, 38, 42) reported that the pooled prevalence of insomnia among HCWs was 44.1% (95% CI: 31.3–57.0%,  $I^2 = 98\%$ ,  $P < 0.01$ ), with a range from 21.3 to 65.2% (Figure 7A). About 11.8% of the HCWs were identified by instruments to be with moderate to severe anxiety (Figure 7B).

### Prevalence of PTSS

Five studies (15, 31–33, 36) reported that the pooled prevalence of PTSS among the HCWs was 25.6% (95% CI: 11.8–39.4%,  $I^2 = 99\%$ ,  $P < 0.01$ ), with a range from 5.7 to 50.7% (Figure 7C).

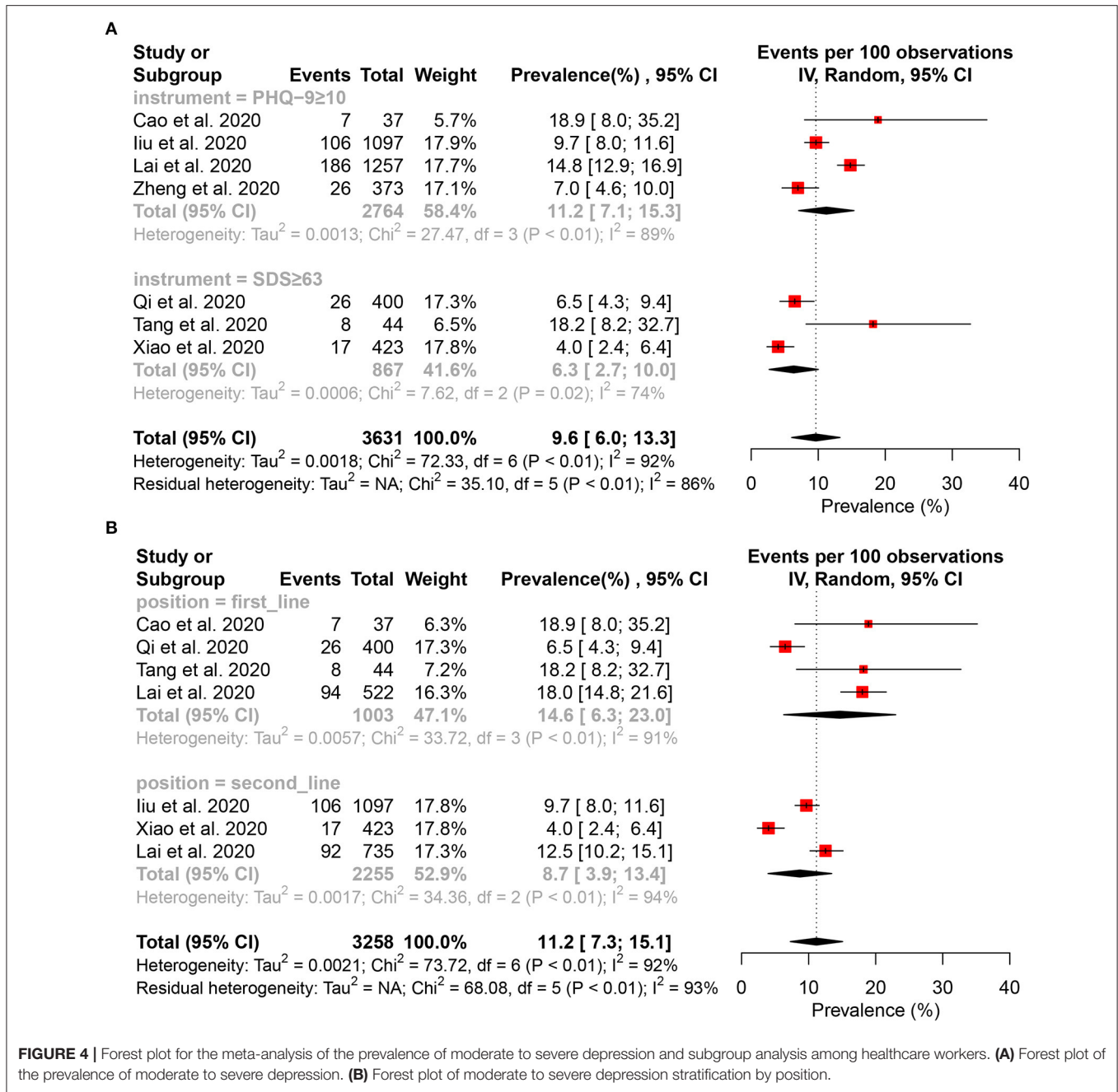
### Other Mental Health Problems

Four studies (27, 35, 38, 40) evaluated obsessive–compulsive symptoms (Figure 7D), somatization symptoms (Figure 7E), and phobia (Figure 7F), and their prevalence were 16.2% (95% CI: 3.0–29.5%,  $I^2 = 93\%$ ,  $P < 0.01$ ), 10.7% (95% CI: 1.9–19.6%,  $I^2 = 88\%$ ,  $P < 0.01$ ), and 35.0% (95% CI: 8.6–61.4%,  $I^2 = 98\%$ ,  $P < 0.01$ ) separately.

### Risk Factors of Mental Health Problems

A total of four studies reported on the risk factors of mental health problems (15, 17, 29, 38). Due to a lack of consistency in methods, outcome metrics, and control groups, a narrative synthesis of risk factors was conducted, with the main findings tabulated (Table 2). Poor health status/organic diseases, female, working in a secondary hospital, intermediate technical title, and frontline/high-risk contact with COVID-19 were the risk factors for depression. Compared with non-medical staff working in hospitals, the occupational attributes of medical staff were a protective factor. For anxiety, the risk factors were as follows: fear of COVID-19 infection, poor health status/organic diseases, female, working in a





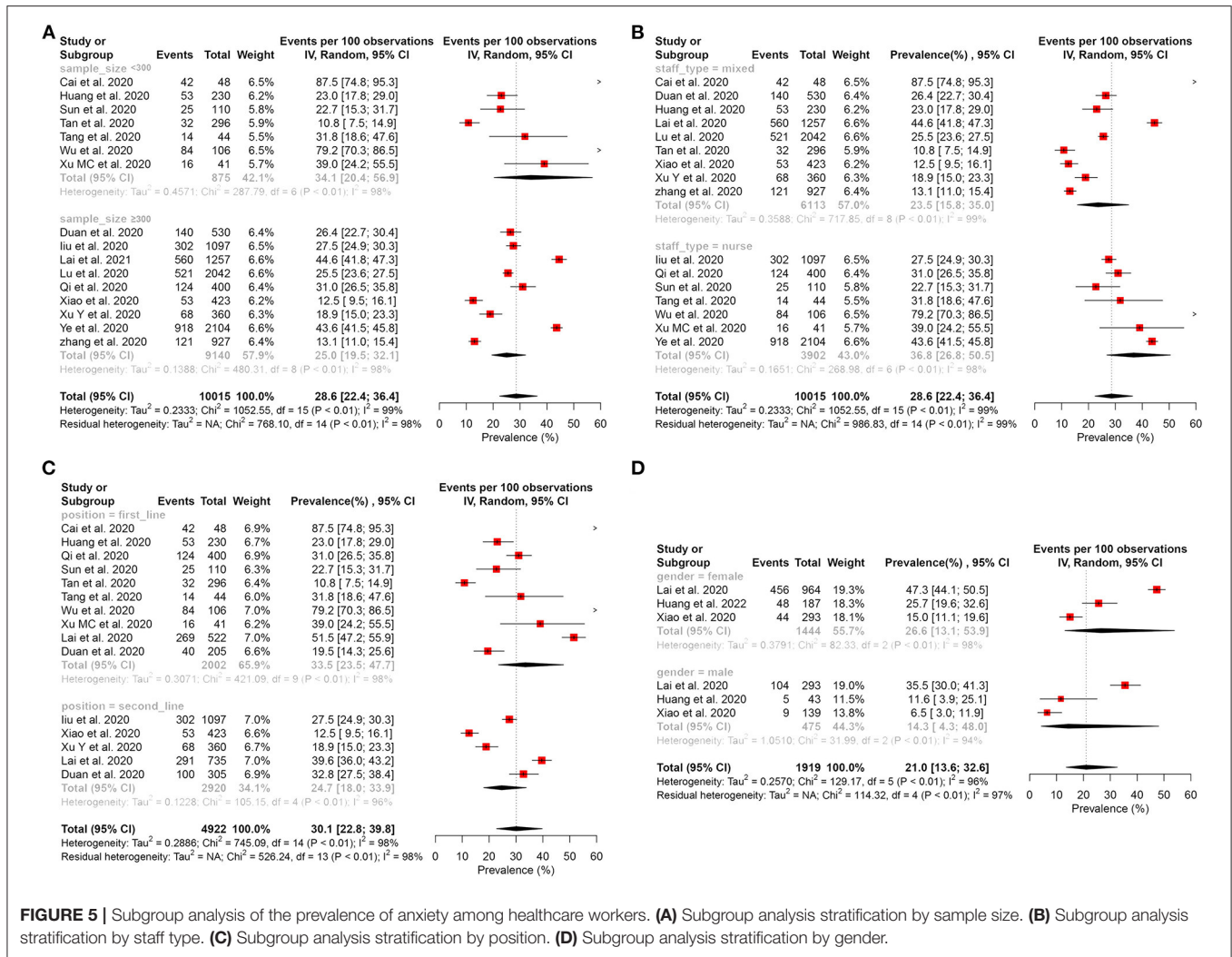
**FIGURE 4 |** Forest plot for the meta-analysis of the prevalence of moderate to severe depression and subgroup analysis among healthcare workers. **(A)** Forest plot of the prevalence of moderate to severe depression. **(B)** Forest plot of moderate to severe depression stratification by position.

secondary hospital, intermediate technical title, frontline/high-risk contact with COVID-19, and living in rural areas. Similar to the protective factor of depression, the professional attribute of medical staff was the protective factor relative to non-medical staff working in hospitals. Working in frontline, living in rural areas, contact with COVID-19 patients, and organic diseases were the risk factors of insomnia. Female, intermediate technical title, and frontline were the risk factors of PTSS, while working outside Hubei province was the protective factor. Living in rural areas, organic diseases, and contact with patients with COVID-19 were the risk

factors of obsessive-compulsive symptoms. The risk factors for somatization symptoms were living in rural areas and organic diseases.

### Heterogeneity Analysis

To identify potential sources of heterogeneity, a subgroup analysis was conducted. However, high heterogeneity was not significantly explained by sample size, staff type, position, and gender (Figures 3, 5). In the univariate meta-regression analyses of the prevalence of depression, a significant estimate was found for the covariate of instruments with R<sup>2</sup> (amount of heterogeneity



**FIGURE 5 |** Subgroup analysis of the prevalence of anxiety among healthcare workers. (A) Subgroup analysis stratification by sample size. (B) Subgroup analysis stratification by staff type. (C) Subgroup analysis stratification by position. (D) Subgroup analysis stratification by gender.

accounted for) = 67.75%,  $P < 0.0001$ . No significant estimates were found for the covariates of sample size (less or more than 300), hospital (survey in one or more hospital), country (China or another country), position (frontline or second-line), or staff type (nurses or mixed with nurses and doctors). The meta-regression showed that country was significantly associated with the prevalence of anxiety ( $R^2 = 4.63\%$ ,  $P < 0.0001$ ); however, it was not significantly correlated with instrument ( $R^2 = 18.11\%$ ,  $P = 0.0533$ ), sample size ( $R^2 = 19.56\%$ ,  $P = 0.1469$ ), hospital ( $R^2 = 0.00\%$ ,  $P = 0.7880$ ), position ( $R^2 = 11.11\%$ ,  $P = 0.1744$ ), and staff type ( $R^2 = 0.00\%$ ,  $P = 0.1030$ ). A sensitivity analysis was conducted by excluding, one by one, the included studies that demonstrated no substantial alteration (Supplementary Tables 1, 2; Supplementary Figures 1, 2).

### Publication Bias

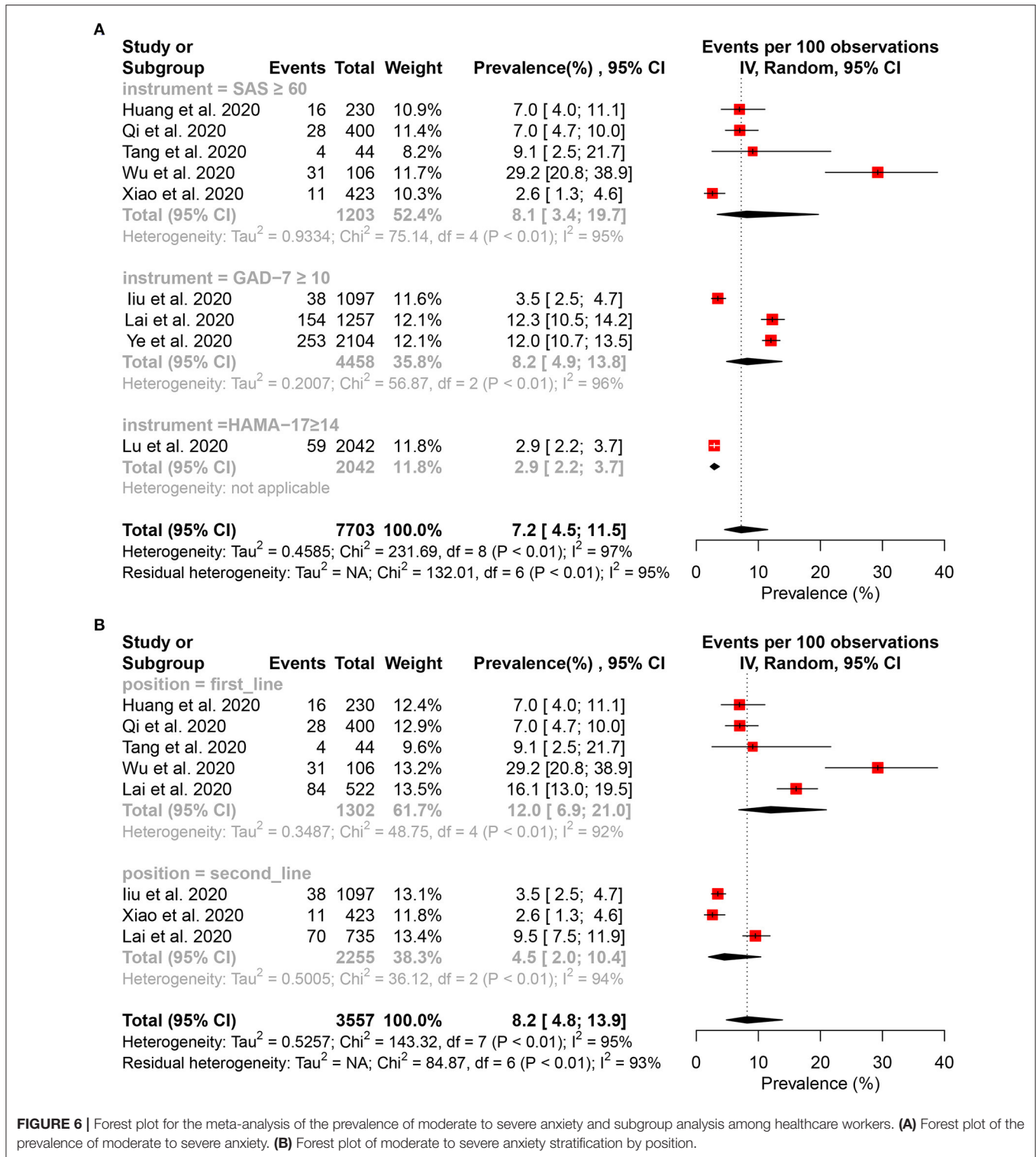
The funnel plot for the primary outcomes seems somewhat asymmetrical (Supplementary Figures 3, 4). However, the Egger's linear regression test of funnel plot asymmetry was

performed, and it indicated no significant asymmetry ( $P_{depression} = 0.3001$ ,  $P_{anxiety} = 0.1045$ ).

### DISCUSSION

The present study investigates the prevalence and risk factors of mental health problems among HCWs during the COVID-19 pandemic based on 10,886 HCWs summarized in 20 cross-sectional studies. According to our research, the prevalence of depression, anxiety, insomnia, PTSS, phobia, obsessive-compulsive symptoms, and somatization symptoms was 24.1, 28.6, 44.1, 25.6, 35.0, 16.2, and 10.7%, respectively. These findings highlight an important issue in HCWs during the COVID-19 pandemic.

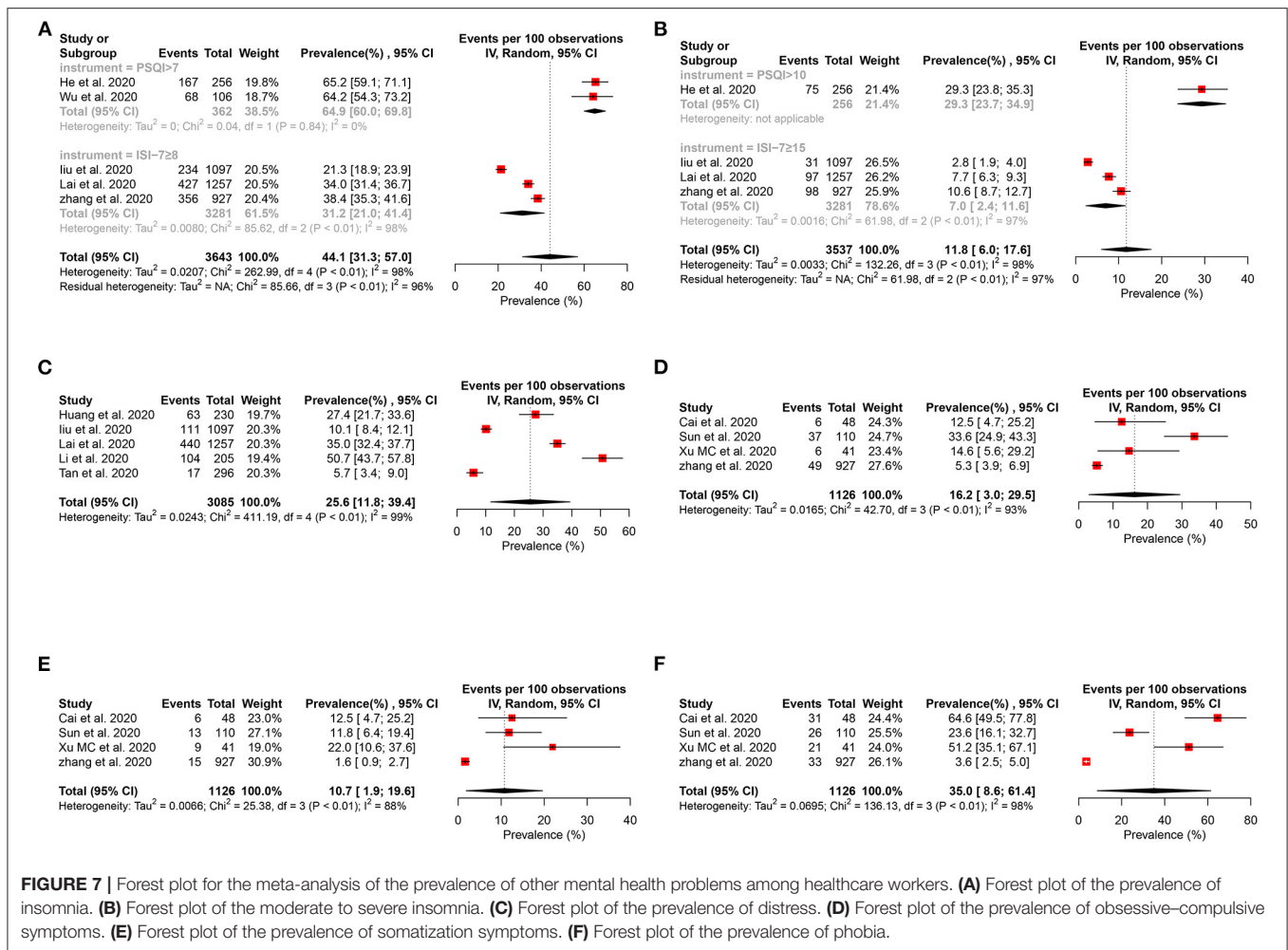
It is no surprise that HCWs have a much higher prevalence of mental health problems during the COVID-19 pandemic. There are many factors that can explain this. The ever-increasing number of confirmed and suspected cases, overwhelming workload, depletion of personal protection equipment, widespread media coverage, lack of specific drugs, and feelings



**FIGURE 6 |** Forest plot for the meta-analysis of the prevalence of moderate to severe anxiety and subgroup analysis among healthcare workers. **(A)** Forest plot of the prevalence of moderate to severe anxiety. **(B)** Forest plot of moderate to severe anxiety stratification by position.

of being inadequately supported may all contribute to the mental burden of these HCWs (44). Previous studies showed that HCWs feared contagion and infection of their family and experienced high levels of PTSS, anxiety, and depression symptoms during the outbreak of SARS in 2003 (45, 46). The

mental health problems faced by medical staff may be related to many difficulties in work safety, such as the insufficient understanding of the disease at the initial stage, the lack of knowledge concerning prevention and control, the long-term heavy workload, the high risk of exposure to confirmed or



suspected cases, the shortage of medical protective equipment, the lack of rest, and the exposure to critical life events during the COVID-19 pandemic (38, 47).

It is worth noting that 25.6% of HCWs suffer from PTSS. Post-traumatic stress disorder (PTSD) is a common consequence of major disasters. During the COVID-19 pandemic, HCWs have endured huge threats and unprecedented challenges, which may cause them to develop acute stress disorder that will potentially degenerate into chronic PTSD over time. A survey conducted 2 months after the outbreak of SARS in Singapore revealed that ~20% of HCWs were suffering from PTSD (48). What is more, a cohort study that lasted 30 months post-SARS among SARS survivors found that HCWs have a much higher percentage of chronic PTSD than non-HCWs (40.7 vs. 19%;  $P = 0.031$ ) (49). Additionally, female, working in frontline, and intermediate technical title were the risk factors of PTSS during the COVID-19 pandemic; however, working outside Hubei province was the protective factor (15).

We found that 70% of all participants were female (most of whom were nurses). Moreover, a subgroup analysis revealed that females and nurses had a high prevalence of depression and

anxiety. During the SARS outbreak, a study conducted among HCWs in emergency departments also showed that nurses were more likely to develop distress than physicians (50). During the COVID-19 pandemic, frontline nurses may be at risk of infection due to the close and frequent contact with patients and the longer-than-usual working hours during the COVID-19 pandemic. This also reminds us that the society should be more concerned on the mental health of women and nurses during the major epidemic.

Another important finding in the subgroup analysis revealed that the frontline HCWs had a higher prevalence of anxiety and a lower prevalence of depression than the second-line HCWs. A high level of anxiety in the early stage of the emerging infectious disease may be an adaptive defense mechanism response to potentially threatening events (51). However, when it is chronic or disproportionate, it becomes harmful and can be a key component in the development of various psychiatric disorders (51, 52). What deserves our attention is that, compared with the second-line HCWs, the proportions of moderate-to-severe anxiety and depression are higher among the frontline staff. Working in the center of a pandemic area such as Wuhan or



**TABLE 2 |** Risk factors of mental health problems among healthcare workers during the COVID-19 pandemic.

References	No. of HCWs	Method	Effects	Risk factors for depression	Risk factors for anxiety	Risk factors for insomnia	Risk factors for distress	Risk factors for obsessive-compulsive symptoms	Risk factors for somatization symptoms
Duan et al. (29)	530	Multivariable logistic regression analysis	Unadjusted OR	Poor health status, 3.16 (2.03–4.91), $p < 0.001$ Frontline medical staff, 0.37 (0.25–0.7), $p = 0.001$ (comparison: non-medical staff in the hospital) General medical staff, 0.42 (0.31–0.79), $p = 0.003$ (comparison: non-medical staff in the hospital)	Worrying about covid-19 infection, 1.86 (1.59–2.17), $p < 0.001$ Poor health status, 2.84 (1.85–4.36), $p < 0.001$ Frontline medical staff, 0.37 (0.21–0.64), $p = 0.005$ (comparison: non-medical staff in the hospital) General medical staff, 0.59 (0.36–0.95), $p = 0.031$ (comparison: non-medical staff in the hospital)	None	None	None	None
Lai et al. (15)	1257	Multivariable logistic regression analysis	Adjusted OR	Female, 1.94 (1.26–2.98), $p = 0.003$ Secondary hospital, 1.65 (1.17–2.34), $p = 0.004$ Intermediate technical title, 1.77 (1.25–2.49), $p = 0.001$ (comparison: junior technical title) Frontline, 1.52 (1.11–2.09), $p = 0.01$	Female, 1.69 (1.23–2.33), $p = 0.001$ Secondary hospital, 1.43 (1.08–1.90), $p = 0.01$ Intermediate technical title, 1.82 (1.38–2.39), $p < 0.001$ (comparison: junior technical title) Frontline, 1.57 (1.22–2.02), $p < 0.001$	Frontline, 2.97 (1.92–4.60), $p < 0.001$	Female, 1.45 (1.08–1.96), $p = 0.01$ Intermediate technical title, 1.94 (1.48–2.55), $p < 0.001$ (comparison: junior technical title) Frontline, 1.60 (1.25–2.04), $p < 0.001$ Outside Hubei province, 0.62 (0.43–0.88), $p = 0.008$	None	None
Lu et al. (17)	2042	Ordinal logistic regression model	Unadjusted OR	High-risk contact, 2.016 (1.102–3.685), $p = 0.023$	High-risk contact, 2.062 (1.349–3.153), $p = 0.001$	None	None	None	None
Zhang et al. (38)	927	Multivariable logistic regression analysis	Unadjusted OR	Female, 1.85 (1.11–3.08), 0.02 Organic diseases, 2.51 (1.51–4.18), $p < 0.01$	Female, 1.80 (1.10–2.95), $p = 0.02$ Living in rural areas, 1.88 (1.09–3.21), $p = 0.02$ Contact with COVID-19 patients, 2.06 (1.28–3.32), $p < 0.01$ Organic diseases, 2.85 (1.73–4.68), $p < 0.01$	Living in rural areas, 2.18 (1.42–3.35), $p < 0.01$ Contact with COVID-19 patients, 2.53 (1.74–3.68), $p < 0.01$ Organic diseases, 3.39 (2.20–5.22), $p < 0.01$	None	Living in rural areas, 2.49 (1.21, 5.11), $p = 0.01$ Contact with COVID-19 patients, 3.27 (1.75–6.11), $p < 0.01$ Organic diseases, 2.24 (1.07–4.71), $p = 0.03$	Living in rural areas, 4.78 (1.55–14.76), $p < 0.01$ Organic diseases, 7.89 (2.75–22.62), $p < 0.01$

high-risk contact with COVID-19 patients in frontline positions, such as the emergency department, respiratory department, fever clinic, etc., is a risk factor for mental health problems (15, 17, 38). For this reason, we should pay more attention to the frontline medical staff. Timely screening and appropriate intervention are important to reduce the severity and chronicity of mental health problems.

In addition, the physical condition of medical staff was an important risk factor for mental health problems. The prevalence of depression, anxiety, insomnia, obsessive-compulsive symptoms, and somatization symptoms of medical staff with poor health conditions or comorbidities of organic diseases is higher than that of the healthy ones (29, 38). Surprisingly, living in rural areas is a risk factor for anxiety, insomnia, obsessive-compulsive symptoms, and somatization symptoms (38). Differences in the working environment, medical technology, and the knowledge of COVID-19 may partially explain this phenomenon.

Limitations should be considered when interpreting the findings of this study. First, it was limited in scope. Of the 20 studies, 19 are from China, 15 of which are published in Chinese and thus limiting the generalization of other countries. Second, it is important to note that the vast majority of participants were assessed by a self-rating scale rather than by gold-standard diagnostic clinical interviews for mental health disorders, and the duration of symptoms of most participants did not meet the diagnostic criteria. The sensitivity and the specificity of these instruments for diagnosing mental health problems vary substantially. Third, all studies are cross-sectional studies, and there is no longitudinal study. Moreover, most of them were completed in February 2020 or earlier. With the increasingly arduous situation, the mental health symptoms of HCWs could become more severe. Fourth, many other factors that could predispose medical staff to anxiety, for example, family history and emotional trauma, could not be assessed due to the wide variability of factors examined in the studies. Finally, only a few studies have explored the risk factors of mental health problems, which are not sufficient to fully understand the problem.

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Moreover, all studies on risk factors were of a cross-sectional design, without baseline control and follow-up data, so it is impossible to determine the causal relationship between them. Some risk factor studies have not controlled for confounding factors and cannot exclude the influence of factors such as working position, COVID-19 exposure intensity, and some sociodemographic factors.

## CONCLUSIONS

In this systematic review, HCWs have a relatively high prevalence of depression, anxiety, insomnia, PTSS, phobia, obsessive-compulsive symptoms, and somatization symptoms during the COVID-19 pandemic, and focus should be on the HCWs at high risk of mental health problems. Further research is needed to identify effective strategies for preventing and treating mental health problems among HCWs during the COVID-19 pandemic.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## AUTHOR CONTRIBUTIONS

QH, DW, HW, and QW contributed to research conception and study design and contributed to data analysis/interpretation. QH, DW, MX, YT, YD, LZ, MD, and YW contributed to search and data acquisition. QH and DW contributed to statistical analysis and manuscript writing. QW and HW took responsibility that this study has been reported honestly, accurately, transparently, and contributed very important intellectual content during manuscript drafting or revision and accepts accountability for the work. All authors read and approved the final manuscript.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2021.567381/full#supplementary-material>

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# Coping With Oral Tongue Cancer and COVID-19 Infection

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To date, April 19, 2021, the coronavirus disease 2019 (COVID-19) caused about 140,886,773 confirmed cases and more than 3,000,000 deaths worldwide since the beginning of the pandemic. Oncology patients are usually frail due to the fear of prognosis, recurrence, and outcomes of treatments. Thus, coping with cancer is a complicated process that is necessary to overcome oncological challenge, even more in case of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) disease. This is a brief case report on a middle-aged man affected by advanced oral tongue cancer and COVID-19, describing his experience of cancer diagnosis, surgical treatment, and rehabilitation during the hospital quarantine for COVID-19. Besides the traumatic experience due to the functional alteration in breathing, eating, and speaking caused by major surgery and the concurrent facial disfigurement, our patient had to face a COVID-19 diagnosis, which implied hospital and social isolation. The aim of this perspective work is to focus on the role of the psychological support in the management of hospital distress related to COVID-19 psychophysical loneliness or alienation. In our experience, such support should anticipate patients' oncological surgery or treatment and should be implemented through telemedicine in case of isolation or after hospital discharge.

**Keywords:** oral tongue cancer, psychological distress, Coronavirus SARS-CoV-2, loneliness, coping, telemedicine

## INTRODUCTION

To date, April 19, 2021, the coronavirus disease 2019 (COVID-19) has caused 140,886,773 confirmed cases and 3,000,000 deaths worldwide, since the beginning of the pandemic (1). In the current international health emergency caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), the whole healthcare system has been facing an unprecedented crisis: both medical and psychological aspects are continuously evolving.

During the current pandemic, in some hospitals oncological treatments have continued despite the lack of places in intensive care units and surgical theaters due to the high number of severe COVID-19 cases (2–8).

Oral tongue carcinoma is a rare tumor but the most common cancer of the oral cavity, and surgery remains the gold standard of treatment (9). Among head and neck cancers, tongue neoplasm is surely the most psychologically traumatic cancer (10) due to the distressing alteration of essential functions. These include eating, swallowing, breathing, speech, loss of taste and smell, impaired sensitivity, xerostomia, residual pain, swelling, and facial disfigurement (11, 12). Moreover, disease and treatment cause heavy disabilities and patients often have to face extensive rehabilitative programs, consisting of speech therapy, swallowing, and dental/maxillofacial restoration, as well as physical and occupational therapies (13).

The diagnosis of oral cancer is one of the most psychologically traumatic events to experience (14). Among other disturbing (or afflicting) aspects, social isolation, and altered perception of the future perspectives are of utmost importance.

Although recently, most attention has been on the current pandemic, the incidence of all other diseases has not decreased, and COVID-19 has in part exacerbated medical and psychological conditions which were already in a precarious balance.

## ARTICLE TYPES

This study is a perspective, case report presentation. The study was reviewed by the European Institute of Oncology (IEO) Ethic Committee (IEO code 2432), and an informed consent for confidentiality, privacy, and data protection was obtained by the patient.

### Medical Case Presentation

On March 9, 2020, the day after Italy was placed in a national strict “lockdown” due to exponential increase of COVID-19 cases, a 50-year-old male patient was admitted to the Division of Otolaryngology and Head and Neck Surgery Division at the European Institute of Oncology in Milan for advanced oral tongue cancer treatment (15). He had no history of smoking and alcohol habits and no psychiatric records. According to the international guidelines for his disease stage, he underwent major surgery: right glossectomy type IIIA plus en-block ipsilateral neck dissection, temporary tracheotomy, and reconstruction of the oral defect with a radial forearm free flap. Surgery lasted for 12 h (16). On the second postoperative day, a nasopharyngeal swab and a bedside chest X-ray were performed for persistent fever and episodes of mild hypoxemia, revealing SARS-CoV-2 pulmonary infection. Thus, the patient was placed in droplet isolation and the hospitalization time was doubled. During his quarantine, the patient also requested psycho-oncological support. The patient’s social isolation continued for 6 weeks after hospital discharge, due to persistent viral positivity of nasopharyngeal swabs, further worsening his psychological frailty.

### Psychological Consequences of COVID-19 After Head and Neck Major Surgery

The usual postoperative course for patients undergoing major surgery for tongue cancer is very complicated: speaking is

not allowed, head mobilization is generally impaired, and face edema and scars represent difficult steps to overcome. Oral feeding is usually avoided until the 7th postoperative day, if no complication occurs, and swallowing and speech rehabilitation are very challenging.

For these reasons, even during the “non-pandemic era” patients affected by oral cancer could easily enter into a depressive status. In oral cancer patients, depressive symptoms are closely associated with treatment adherence, self-care behaviors, re-socialization, and aspects of resilience (13). Depression and fear of cancer recurrence and future life conditions are psychological aspects which commonly characterize the postoperative phase (14, 17, 18).

Consequently, patients have to face their conditions through coping strategies. Coping is “a cognitive and behavioral effort to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person” (19, 20).

Clearly, COVID-19 can only worsen the physical and psychological challenges which usually arise in an oral cancer patient.

During the COVID-19 pandemic, our Hospital applied several measures (8). Above all, patients’ family members and friends were not allowed to visit because of the risk of virus infection during postsurgery rehabilitation (8). Unfortunately, several studies confirm that isolation affects patients’ adherence to self-care and rehabilitation schedules, decreasing their motivation (21–25). This clinical and social scenario exposes patients to a higher risk of psychological burden, as recently published (23, 26).

## DISCUSSION

All discussed health-related conditions affected the normal coping strategies of our patient and increased his vulnerability (27).

During the postoperative rehabilitation, the patient was troubled by the fear of his oncologic disease and concurrent COVID-19. He openly discussed his concerns and anxiety of cancer recurrence, his future, and his problems of going back home, alone and isolated. He repeatedly mentioned the uncertainty of his cancer prognosis and the fear of dealing with the surgical outcomes, mainly the impaired ability to eat and speak. Furthermore, his consideration of the future was worsened by the consciousness of being infected by SARS-CoV-2, deteriorating his mood with consequent psychological consequences, thus prompting a mandatory psycho-oncological support. During the first psycho-oncological session, we assessed his need of support, since recent evidences show that well-being requires a comprehensive health-related quality of life assessment (28).

As the patient expressed anxiety and fears on the consequences of COVID-19 test positivity, we decided to offer two psychological sessions per week. The aim was to provide support for the hospitalization distress, exacerbated by loneliness and the viral infection.

He reported his anxiety due to confinement, loss of usual routine, and reduced social and physical contact with others. This condition caused boredom, frustration, and sense of isolation from the rest of the world. His feelings were exacerbated by his inability to speak well, which also limited the use of devices for remote communication, such as video calls on phone or tablet, used for worldwide connection with friends and family in the pandemic time (29).

The patient's awareness of his vulnerability was the starting point for the psychological support. The psychologist together with the patient planned a daily schedule of activities, in order to decrease boredom, loss of routine, and helplessness. With time, the patient showed increased locus of control and self-regulation by organizing activities and managing well his time (self-care, video call with football team, friends). Unfortunately, 3 weeks after surgery he tested positive for COVID-19 again.

The patient was discharged on the 23rd postoperative day and was asked to maintain self-isolation as required by national health dispositions.

Upon discharge after such complex procedures such as head and neck surgery, patients are usually happy and eager to return home. On the contrary, in this case, the idea of discharge increased the patient's concerns. He emphasized the fear of infecting his family members and to be alone and was worried that this infection could affect his postoperative course (29).

Because of his condition, the psychological support proceeded even after discharge, with interviews scheduled regularly twice a week. The counseling sessions were arranged by video calls. As described, the home quarantine strongly affected the patient's psychological distress, more than the cancer itself (30). This profound anxiety and depression disturbed the patient during his convalescence, until the long-expected negative swab, when the patient was finally allowed to embrace his family.

These events led us to reflect on the importance of a psychological support for all surgical patients during the pandemic era.

At the referral Hospital, as reported by international guidelines, psychological support is routinely provided to patients affected by head and neck cancer, especially to patients who have undergone complex and demolitive surgical treatment (31), such as the one herein presented.

Previously, in the non-COVID era, during hospital stay, psychological support generally consisted in two or three meetings, when requested by the patient. These meetings are focused on the impact of demolitive surgery on the patient's future and quality of life. In case of a COVID-positive patient, all issues related to the impact of the oncological disease on life are amplified because of COVID-19 diagnosis. Indeed, these patients are faced with two diagnosis: cancer and the SARS-CoV-2 infection. Moreover, we are planning to compare the psychological status of patients with oral tongue cancer who developed COVID-19 to others without COVID-19 in a future study.

The major limitation of this prospective work is that it is a simple case report, with results that cannot be neither generalized nor easily applicable in a wider patient cohort.

However, we underline that case reports on oncological matters also have a role in medical education, inspiring profound scientific research questions for clinicians and scientists. This is especially relevant in this scenario, where tongue tumors are a rare oncological pathology and, as such, even a single case can be very instructive for clinicians. Furthermore, this case report highlights the importance of psychological support and should be tailored to the new needs of each patient in this current pandemic era.

Most likely, the psychological support should be anticipated in order to prepare oncological patients in managing their life postsurgery and treatment, by focusing not only on their cancer disease but also on a possible SARS-CoV-2-related condition. From now on, the preoperative patient's interview should be implemented by explaining how the new health conditions might affect their treatments and recovery on the top of the oncological disease.

The use of telemedicine may be a valid support to keep in contact with our fragile patients both during COVID-induced isolation and after discharge. A remote-controlled technologic device is an essential tool today to be able to focus on patients' mental health and well-being in this COVID-19 time. In fact, this first case occurring at the onset of the Italian pandemic era prompted in our hospital the structuring of psychological tele-visits to provide methodical health support for all COVID-positive cancer patients.

In conclusion, the psycho-oncological support could play a crucial role in many aspects of head and neck cancer patients' care. It may need to be adapted and enhanced in this pandemic period. These reflections lead to interesting suggestions toward the elaboration of future preventing strategies in times of stress and crisis for the healthcare system.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

## AUTHOR CONTRIBUTIONS

MT conceptualized and designed the study. RD and PG drafted the initial manuscript and carried out and reviewed the literature review. FC and GPi revised the manuscript. SC, MA,

GPr, and FM critically reviewed the manuscript for important intellectual content. All authors approved the final manuscript as submitted and agreed to be accountable for all aspects of this work.

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# Perceived Stress During the First Wave of COVID-19 Outbreak: Results From Nationwide Cross-Sectional Study in Estonia

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**Objective:** To study the population-level mental health responses during the first wave of coronavirus disease 2019 (COVID-19) outbreak in Estonia and analyze its socio-demographic, behavioral, and health-related variations among general population.

**Methods:** This study used nationally representative data on 4,606 individuals, aged 18–79 years from a rapid-response cross-sectional survey conducted in April 2020. Point prevalence and mutually adjusted prevalence rate ratios for perceived stress from log-binomial regression analysis were presented for socio-demographic, behavioral, and health-related variables.

**Results:** This study found that 52.2% of population aged 18–79 reported elevated stress levels in relation to COVID-19 outbreak. Higher levels of perceived stress were found in women, in younger age groups, in Estonians, and in those with higher self-perceived infection risk, presence of respiratory symptoms, and less than optimal health, according to self-reports.

**Conclusion:** Although, the potential long-term health effects of the current crisis are yet unknown, the alarmingly high stress levels among people indicate that the COVID-19 pandemic might have had a widespread effect on people's mental health.

**Keywords:** COVID-19, SARS-CoV-2, pandemic, mental health, stress, Estonia

## INTRODUCTION

The ongoing outbreak of novel coronavirus SARS-CoV-2 started in December 2019 with the first documented cases of pneumonia of unknown origin registered in Hubei province, China (1). Despite the efforts to contain the virus locally, it spread rapidly across the world, and on March 11, 2020, the coronavirus disease 2019 (COVID-19) outbreak was labeled a pandemic by the World Health Organization. As of mid-March 2021, 120 million cases have been confirmed globally, and the estimated death toll exceeds 2.6 million (2).

While the acute health burden of COVID-19 is undoubtedly heavy, the wider health outcomes of the pandemic might be even more widespread. Evidence from earlier epidemics (e.g., SARS in 2003 or the H1N1 pandemic in 2009) suggests widespread mental health impacts (3–5). People who have been directly infected or those in direct contact with someone with the infection may experience increased stress and anxiety, depression, and also post-traumatic stress disorder (6, 7), but the perceived infection risk could also lead to higher anxiety among non-infected individuals (8). Given the short timeframe, only a limited number of studies have so far analyzed the mental health consequences of the current pandemic. However, the evidence from very recent systematic reviews (9, 10) confirms higher levels of mental health problems during the COVID-19 pandemic. Regardless of the study population, a higher psychological impact of COVID-19 is reported for females, for those having lower socioeconomic status, and for those at higher risk of contracting COVID-19 due to poor health or contact with COVID-19 patients (10).

This paper contributes to the field by covering the immediate mental health responses to the COVID-19 outbreak using a nationally representative dataset. More specifically, we will focus on the prevalence of perceived stress during the first wave of the pandemic in Estonia, where the first COVID-19 case was confirmed on February 25, 2020 (11). With 58 cases diagnosed, a state of emergency was declared by the government on March 12, 2020, to enforce appropriate measures to control the spread of infection. During the first wave, the 14-day incidence peaked on April 6 at 56.6 cases per 100,000 and after gradual decline in newly diagnosed cases, the state of emergency was ended on 17th May 2020 with 14-day incidence being 6.0 per 100,000 (Figure 1). By end of May 2020, ~5% of the population had been tested and fewer than 2,000 COVID-19 cases had been confirmed in total (11). However, Figure 1 also illustrates the situation 10 months later when the ongoing second wave resulted in almost 2,000 new cases daily and the 14-day incidence rate was close to 1,500 per 100,000 as of mid-March 2021.

Although, the current epidemiological situation is in a stark contrast with the first wave of the COVID-19 pandemic in Estonia, several aspects suggest that first wave may have had considerable impact on mental health despite the relatively modest incidence. First, the evolving pandemic saw extensive attention in all media platforms that, coupled with the overall novelty of the situation, may have resulted in increased perception of fear and anxiety (12). Second, the emergency situation itself and the measures taken to contain the spread of infection (13) were unprecedented and affected the daily lives of all inhabitants. In view of this, the aim of the study was to analyze the prevalence of perceived stress and its patterning across sociodemographic, behavioral, and health-related covariates during the first wave of the COVID-19 outbreak in Estonia.

## METHODS AND MATERIALS

### Data

This study uses data from a nationwide rapid-assessment survey conducted during the peak of the first wave of the pandemic in Estonia when the hospitalization rates were at their highest and

most restrictions had been enforced. A nationally representative stratified random sample of 12,000 individuals aged 18–79 years with a valid email address was obtained from Population Registry for the survey. The survey questionnaire was based on locally adapted version of WHO tool for behavioral insights on COVID-19 (14) with additional items on the presence of symptoms of upper respiratory infections, previous COVID-19 testing, self-rated health (SRH), and perceived stress. In total 4,606 responses were submitted during the 10-day study period between April 10 to April 20, 2020. After accounting for 558 cases who were unable to respond due to invalid email addresses, the adjusted response rate was 40.3%. Population weights based on age and gender distribution of the Estonian population were used to adjust for oversampling of youngest and oldest age groups and to compensate for the non-response. The study protocol was approved (no. 271, from April 8, 2020) by the Research Ethics Committee of the National Institute for Health Development.

### Variables

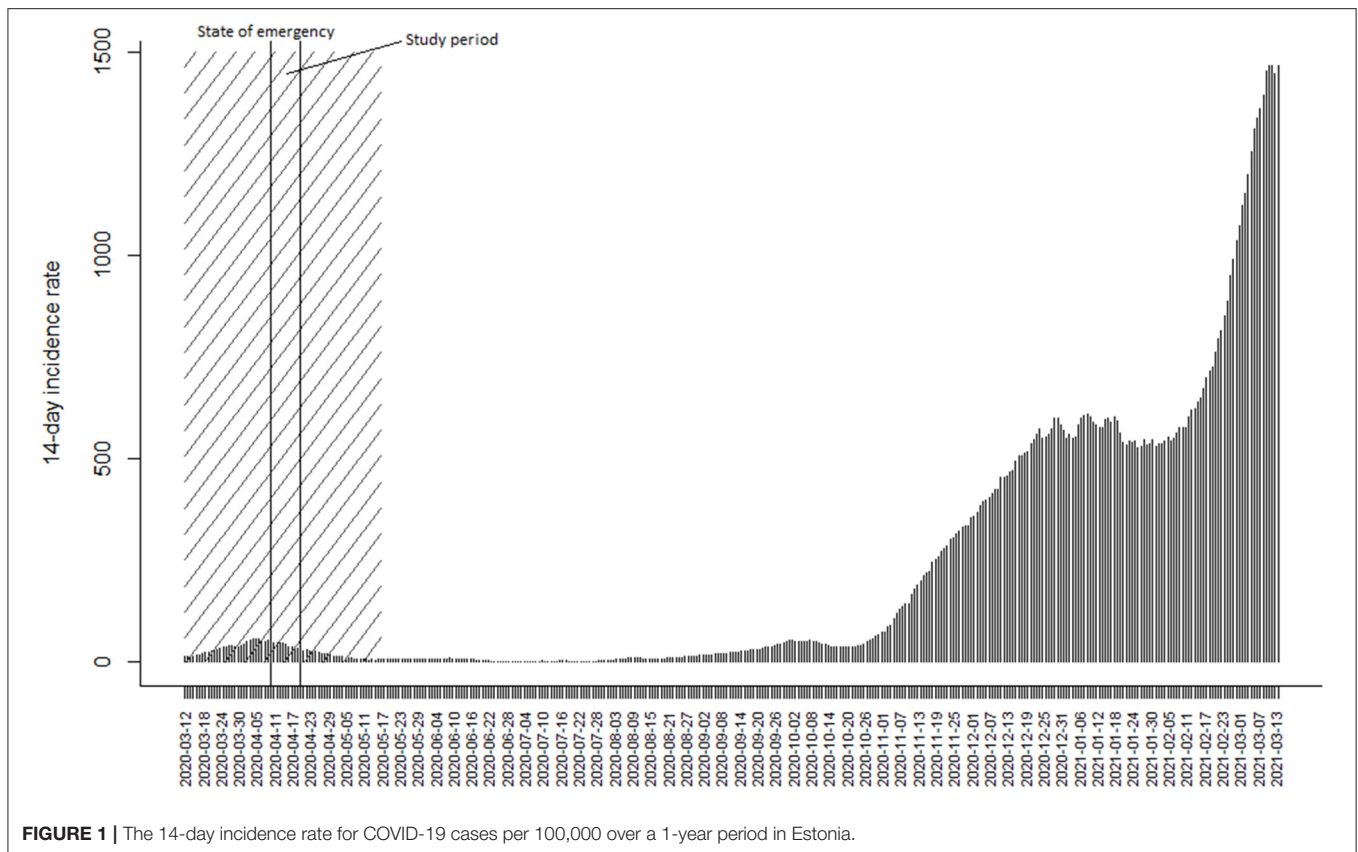
The dependent variable was self-reported perceived stress that was assessed with the question “Are you currently experiencing stress or anxiety?” The response options were dichotomized as (i) excessive stress (“yes, much more than previously” and “yes, somewhat more than previously”), and (ii) not stressed (“yes, but not more than previously” and “no, not at all”). The same instrument has been used in several national health surveys previously and thus provides a valid comparison.

Respondents’ demographic backgrounds were described by variables of gender, age, education, ethnicity, and place of residence. Age effects were analyzed in age groups of (i) 18–34, (ii) 35–49, (iii) 50–64, and (iv) 65–79. Educational level was measured by the highest level of education obtained and dichotomized into categories of (i) up to secondary or vocational and (ii) tertiary education. Self-reported ethnicity was grouped as (i) Estonians and (ii) non-Estonians, referring to other, mostly Russian-speaking ethnic groups. Respondents’ places of residence were dichotomized as (i) rural and (ii) urban areas.

Additional behavioral and health-related items included self-perceived infection risk, conforming to isolation measures, presence of respiratory symptoms, and SRH. Subjective infection risk was assessed with a binary (yes/no) question: “Do you think you are likely to become infected with the novel coronavirus?” Responses to questions “Are you currently in isolation (do you avoid social contact)?” and “Have you experienced symptoms typical of upper respiratory infections since the beginning of March 2020?” were used to assess conformity to isolation measures and presence of respiratory symptoms, respectively. SRH was covered with a single-item question, “How would you assess your present state of health?” with response options dichotomized into the categories (i) average or poor and (ii) good health.

### Analysis

The prevalence of stress was calculated as the proportion of cases reporting excess stress divided by the total number of cases by sociodemographic variables, with 95% confidence intervals (95% CI). To study the variations between stress



**FIGURE 1** | The 14-day incidence rate for COVID-19 cases per 100,000 over a 1-year period in Estonia.

and independent variables, log-binomial regression with robust variance estimates was used for the analysis. This approach avoids the overestimation of the association that is often found for logistic regression when the outcome is frequent (15, 16). The results are presented as exponentiated coefficients from a mutually adjusted model that are interpreted as prevalence ratios (PR) with 95% confidence intervals. All statistical analyses were conducted using SPSS Statistics for Windows, version 25.0 (IBM Corp. 2017). A  $p$ -value  $<0.05$  was regarded as statistically significant.

## RESULTS

In total, 52.2% of the respondents felt excessive stress e.g., were currently more anxious or stressed than previously (**Table 1**). The prevalence of stress was higher among women, in younger age groups, Estonians and among respondents with higher self-perceived infection risk, presence of respiratory symptoms, and less-than-good SRH.

In the mutually adjusted regression model, excess stress was significantly higher among women compared to men (PR 1.09; 95% CI 1.07–1.11), in younger age groups compared with 65- to 79-year-olds, and among Estonians compared to non-Estonians (PR 1.05; 95% CI 1.03–1.09). As with crude prevalence, the respondents' education or place of residence did not differentiate stress levels. However, those with higher self-perceived infection

risk, presence of respiratory symptoms, and less-than-good SRH had higher stress levels.

## DISCUSSION

### Main Findings

This study found that over half of the population experienced excess stress with higher stress prevalence found among women compared with men, in age groups below 65 years compared with 65- to 79-year-olds, and among Estonians compared with non-Estonians. In addition to these sociodemographic factors, higher stress was reported by those with higher self-perceived infection risk, presence of respiratory symptoms, and less-than-good SRH. With slight variations, these findings are generally in accordance with previous evidence (10) on the sociodemographic patterning of mental health outcomes during COVID-19 pandemic.

The alarmingly high stress levels found in current data are in stark contrast with earlier data from 2018 (17), where similar stress indicators were reported by 18.7% of men and 20.7% of women (19.9% in total). Also, the current stress prevalence is more than 2-fold compared with data from the previous economic recession in 2010 (17). As economic recessions lead to rises in unemployment levels and reductions in staff and wages are correlated with an increase in mood disorders, anxiety, depression, and suicide (18), it is very likely that both the direct epidemiological emergency and its wider social and economic consequences have already translated into an increase in mental

**TABLE 1** | Prevalence rates and adjusted prevalence ratios with 95% confidence intervals for excessive stress.

		Total sample (n = 4,606)		Prevalence	Prevalence ratio <sup>a</sup>
		N	%	% (95% CI)	PR (95% CI) <sup>b</sup>
Gender	Women	2,396	52.2	58.2 (56.3–60.2)	<b>1.09 (1.07–1.11)</b>
	Men	2,190	47.8	45.5 (43.4–47.6)	1
Age	18–34	1,271	27.8	55.3 (52.6–58.0)	<b>1.12 (1.08–1.15)</b>
	35–49	1,267	27.6	54.9 (52.2–57.7)	<b>1.10 (1.06–1.13)</b>
	50–64	1,182	25.8	50.9 (48.1–53.8)	<b>1.06 (1.03–1.09)</b>
	65–79	861	18.8	45.1 (41.8–48.4)	1
Education	≤ Secondary/vocational	2,695	58.8	51.1 (49.2–53.0)	0.99 (0.97–1.01)
	Tertiary	1,889	41.2	53.6 (51.4–55.9)	1
Ethnicity	Estonian	3,723	81.2	53.4 (51.8–55.0)	<b>1.05 (1.02–1.07)</b>
	Other	861	18.8	46.9 (43.6–50.3)	1
Place of residence	Rural	1,194	26.0	49.7 (46.8–52.5)	0.99 (0.97–1.01)
	Urban	3,390	74.0	53.0 (51.4–54.7)	1
Perceived infection risk	Yes	2,354	53.0	57.6 (55.6–59.6)	<b>1.07 (1.05–1.09)</b>
	No	2,088	47.0	45.7 (43.6–47.8)	1
Being in isolation	Yes	2,376	52.5	52.9 (50.9–54.9)	1.00 (0.98–1.02)
	No	2,148	47.5	51.5 (49.4–53.6)	1
Respiratory symptoms	Yes	663	14.5	61.1 (57.5–64.9)	<b>1.02 (1.00–1.05)</b>
	No	3,909	85.5	50.7 (49.1–52.3)	1
Self-rated health	Average or poor	1,029	22.5	63.1 (60.1–66.0)	<b>1.12 (1.09–1.14)</b>
	Good	3,548	77.5	49.0 (47.3–50.6)	1

<sup>a</sup>Adjusted for all covariates listed.

<sup>b</sup>Statistically significant ( $p < 0.05$ ) associations are given in boldface.

health problems as suggested by a few recently published studies (19, 20).

The demographic patterning of stress indicates that some sociodemographic groups were more affected than others. Similarly to a recent study (21), a distinct age gradient was found, with the highest stress being reported in the youngest age group, despite the evidence that COVID-19 presents a higher health risk for those aged 65 and older (22). This also contradicts earlier evidence on the mental health effects of the economic crisis from Estonia in the late 2000's (23), when perceived depression had increased most in ages 35 and up. However, the causes and the consequences of both crises are very different. As the older generations have experienced stressful life events (e.g., the post war period, Soviet repression, the struggle for independence, and extreme economic difficulties during the 1990's) (24), it is plausible that the current state of emergency with its unprecedented social distancing measures (25) could affect younger age groups the most. Such a negative psychological impact has also recently been demonstrated among undergraduates in the context of the COVID-19 pandemic (26). The gender differences in perceived stress found in our data are supported by earlier evidence that women are generally more vulnerable to stress- and fear-based disorders (27). However, a range of other potential explanations could be relevant in the current context as well. Women more often work in healthcare, the service sector,

and other high-risk occupations in the context of COVID-19. Several studies have shown higher levels of mental health problems in health care workers and in customer service during the current pandemic (28, 29). Moreover, the school closures and social distancing measures could put additional strain on women due to increase in tasks related to childcare, housework and caring for the sick (30). The higher stress prevalence seen in Estonians compared with other, mostly Russian-speaking ethnic groups is consistent with observed long-term trends in perceived stress and depression (17). This could also suggest that the health communication during the current pandemic has not preferred the majority ethnic group over minorities.

In addition to demographic indicators, several behavioral and health-related variables differentiated stress levels in our data. As the COVID-19 pandemic coincides with the period of seasonal influenza and other upper respiratory infections, self-perceived infection risk and presence of symptoms were both expectedly associated with higher stress. As the most common symptoms of COVID-19 are fever, cough, fatigue, and shortness of breath (31), having similar symptoms could lead to higher anxiety and stress levels. Similarly, those with average or poor SRH had 12% higher prevalence of excessive stress compared with respondents with good SRH. SRH is a valid estimate for overall health status that has strong predictive power for future health outcomes (32). SRH follows the age gradient, and poor health is often associated with



chronic conditions and comorbidities (33) that constitute higher health risk also in the context of COVID-19 (22).

The main strength of the study is the timing of the nationally representative survey that was purposely designed to assess the knowledge and public perception during the first wave of the COVID-19 pandemic. However, some potential limitations of the study need to be addressed. First, the survey relied on a self-assessed, single-item measure of stress and anxiety. Although, it is not sufficient for a clinical diagnosis, it reflects the subjective presence of anxiety and stress-related complaints and allows comparisons with previous health surveys in Estonia. Second, due to the state of emergency, the survey was conducted using a web questionnaire only. Therefore, the representative sample of adults had to include only individuals with valid email addresses in the population registry database. Although, earlier studies (17) have shown that ~90% of individuals have valid email addresses in the population registry database, a potential selection bias cannot be fully excluded in our data. Third, the cross-sectional data do not allow us to establish causality *per se*. Despite this, the time anchoring of the dependent variable provides relevant estimates with respect to the time frame of the current the study. Moreover, the study protocol has been amended to allow additional data collection from the same sample, thus providing an opportunity for a longitudinal design in further studies. Fourth, due to the short data collection period, the response rate was modest (40.3%). Finally, despite the inclusion of different demographic, health-related, and behavioral variables, it is unlikely that the set of variables accounts for the total variance of the dependent variable. Thus, potential residual bias should be considered when interpreting the results. However, the large sample size and the use of population weights to reduce the potential non-response bias assure the representativeness of the data.

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## Conclusions

With over half of the 18- to 79-year-olds experiencing excess stress or anxiety during the first wave of COVID-19 pandemic in Estonia, the potential mental health impacts of the pandemic cannot be ignored. Although, direct causality cannot be established, the underlying uncertainty regarding the social, political, and economic aftermath of the pandemic is potentially said to have widespread negative effects on a population's mental health. Moreover, the long-term effects of current crisis are yet unknown. Further longitudinal studies are therefore needed to assess whether the high stress levels translate into acute or chronic (mental) health problems that could place additional strain on the health sector and affect public health outcomes in general. Close monitoring of the mental health outcomes is therefore warranted to ensure timely access to mental healthcare.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Research Ethics Committee of the National Institute for Health Development. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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# Mindfully Reframing the Psychological Impact of the COVID-19 Outbreak Through a Social Media Community for Students: A Pragmatic Study

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The COVID-19 outbreak and the restrictions that have been enforced by the health authorities are having a profound psychological impact on the population. Many people, including the students, faced forced modifications to their daily lives and this prompted the need for scalable strategies to promote resilience. We designed an online community intervention for psychology students and recent alumni aimed to promote functional coping strategies through openness and cognitive flexibility. This psycho-educational intervention was delivered through a private group on social media (Facebook) during the acute phase of the lockdown period and it involved the publication of exercises and quick lectures. Contents were posted regularly and members of the community were invited to share their comments. The posts included stimuli that promote open and flexible reflections on the current situation. The overall aim of this group was a cognitive reframing on the epidemic effects, promoting creative and flexible thinking. We ran a thematic analysis of the interactions and we collected qualitative feedback at the end of the intervention. The participants' comments dealt with changes in their perspectives, sharing discomfort, encouragement and support, and building a sense of community. Post-intervention comments were highly satisfied and confirmed the helpfulness of the intervention to promote flexibility and openness, eventually helping to manage the negative emotions related to the COVID-19 outbreak. This study provides preliminary evidence that an online psycho-educational community stimulating flexibility and openness can help to reframe the negative psychological impact of the outbreak, improving their management.

**Keywords:** COVID-19, coronavirus, psychological intervention, online community, stress, coping, cognitive flexibility, openness

## INTRODUCTION

The COVID-19 pandemic has spread around the world since December 2019, infecting millions of people and causing hundreds of thousands of deaths (World Health Organization., 2020a). In response to the outbreak, several countries have implemented lockdown and other movement restriction strategies to prevent the virus from spreading. Countries have taken unprecedented measures, which varied across nations. Italy, which has been one of the worst-hit countries by the pandemic (at least in the first phase outside China), imposed a strict lockdown for several weeks. Together with the medical, social, and economical implications of the epidemic, there are multiple psychological consequences (Pfefferbaum and North, 2020; World Health Organization., 2020b). Stress, anxiety, depressive symptoms, sleep problems, and fear have globally increased (Torales et al., 2020). For example, an analysis of social media contents after the outbreak showed an increase in anxiety and depression symptoms and a reduction of life satisfaction and positive emotions (Li et al., 2020).

The lockdown that was implemented by many health authorities in the world restricted personal and work activities, limiting movements, and social contacts. This often resulted in a sense of uncertainty and loss of perceived control, with a negative impact on the psychological well-being (Mertens et al., 2020).

A large survey conducted in Italy at the beginning of the outbreak suggested that cognitive flexibility may be a protective factor against the negative psychological consequences of the COVID-19 situation (Pagnini et al., 2020). This is in line with previous studies reporting that psychological flexibility is a fundamental aspect of well-being (Kashdan and Rottenberg, 2010). A flexible mindset allows an improved adaptation and it helps to cope with challenging situations. Another psychological characteristic that resulted associated with improved well-being and functional coping during the epidemic is openness (Bogg and Milad, 2020; Pagnini et al., 2020), which refers to receptivity to new experiences and ideas. Openness and flexibility are also core components of creativity, which requires to widen the perspectives, connect the dots, and re-organize the relationships (Colombo et al., 2018). The importance of these constructs for well-being has been reported multiple times in the literature. In particular, the Langerian approach to mindfulness defined as the process of making novel distinctions, which includes openness, flexibility, curiosity, and creativity. According to this model, a mindful reappraisal can be provided when one realizes that there are different perspectives on the same aspect (Pagnini and Langer, 2015). This is the essence of Langerian mindfulness and has been repeatedly associated with quality of life (Langer, 1989; Pagnini and Phillips, 2015). Therefore, an improvement of these psychological characteristics generally results in improved well-being and coping skills (Pagnini et al., 2016). Following this theoretical idea, we developed a specific intervention aimed to reframe some negative perspectives about the pandemic and the social restrictions that were imposed during the first lockdown in Italy.

Social media played a particular role in disseminating the information about the outbreak, which sometimes included pitfalls such as fake news and panic transmission (Depoux et al., 2020; Salvi et al., 2021). Despite these risks, these forums can provide a learning space where self-efficacy and coping strategies can be built (Tower et al., 2015), which could represent a scalable and easily implementable strategy to promote adaptive coping against the COVID-19 situation (Van Bavel et al., 2020). During the first period of the pandemic, in Italy, social media were mainly used to exchange information and to share the common sentiment (Bhat et al., 2020), but they rarely provided structured interventions. A rapid review of the available literature on stress interventions for health care providers dealing with coronavirus (Callus et al., 2020) only identified one study protocol (Azam et al., 2019) using a digital intervention. More in general, the worldwide outbreak introduced new social and psychological challenges, which have been faced with both traditional psychological strategies with context-adjusted solutions, such as online consultations (Swartz, 2020), and innovative approaches, such as using VR or other technologies (Riva et al., 2020). Other studies explored the impact of online psychotherapy as a way to reduce coronavirus-related worries (Wahlund et al., 2021) or other forms of anxiety (Chen, 2020).

The project aimed to deliver, through a dedicated Facebook group, a group intervention that lead to a mindful reframing of the current situation. In other words, the goal of this intervention was to boost psychological flexibility, openness, and creativity through an active psycho-educational intervention. Group members were invited, with different stimuli, to embrace an open perspective about the challenges faced during the lockdown. The goal of the group was not only to ease the negative impact, but also to see the potential for growth and development. In this pilot study, we invited psychology students and recent alumni to join the group and its active discussion. The interactions and the subjectively reported effects were qualitatively assessed.

## METHODS

### Design

We conducted a pilot study to explore the interactions and the subjectively reported effects of a Facebook group, designed to stimulate cognitive flexibility, openness, and creativity, through stimuli and discussions. This research is an “active analysis” on Facebook (Eysenbach and Till, 2001), as there was an active interaction between research members and the participants (Franz et al., 2019). After the end of the intervention, the group members were invited to express their views on the program (see **Figure 1**).

### Intervention

On March 20, 2020, we created a private group on Facebook, titled “Coronavirus and quarantine... Shall we grow together?.” About every day or any other day, a stimulus was posted on the discussion wall. These stimuli were either reflections to boost flexible thinking, which included sentences aimed to reframe the



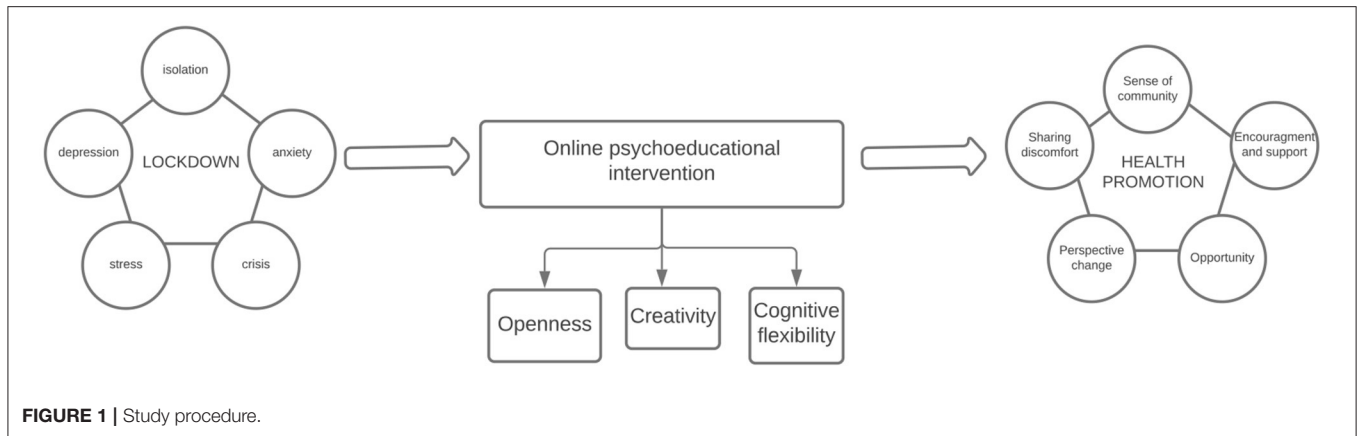


FIGURE 1 | Study procedure.

perspective on the current situation (e.g., “What will you miss of the lockdown, when it will be over?”) or exercises, which suggested activities that prompted a different perspective, such as brushing teeth with the non-dominant hand or to search for unexpected details in a movie. One of these exercises consisted of the voluntary sharing of a personal problem, with the invite to the other group members to help reframing or coping. Contents were all accompanied by an image to facilitate their visibility and improve the engagement. The group was moderated by a member of the research team (EB) and participants were able to reply to the existing posts, but not to create new posts on their own. All the contents were posted in Italian.

## Participants

We invited undergraduates, master’s students, and recent alumni (>3 years) from the Faculty of Psychology at Università Cattolica del Sacro Cuore (UCSC) in Milan, Italy, to join the group. A direct invitation was sent to their university-provided email address and announcements advertising the group were posted in UCSC students’ dedicated groups and pages. A total of 436 people joined the group, out of about 2,500 students and alumni contacted. When they joined the group, they accepted the posting instructions, which also included the consent for analyzing group data. The study was approved by the Ethics Commission of the Department of Psychology at UCSC.

## Data Collection and Analysis

All comments and reactions that were produced by the participants were collected over the 5-week period in which the intervention was conducted and put in a textual database through a careful copy-and-paste process. We recorded all the comments, the de-identified person who made them, and the number of “likes” and “reactions” (i.e., emotional reactions: Love, Fun, Wow, Sad, and Angry). Comments were examined with a thematic analysis (Braun and Clarke, 2006). This approach offers a robust and sophisticated toolkit for the analysis of qualitative data, is mostly appropriate when there is no deep theoretical commitments, and allows to explore the patterns across data (Braun and Clarke, 2014). Two researchers (EM and ET) independently immersed themselves in the materials, assigning the preliminary codes and extrapolating the categories. Once

independently created the categories, the researchers reviewed them with a third researcher (FP) and reached a consensus on the identified themes.

After about a month since the last post, a request for feedback was posted. In this message, there was an invitation to complete a short survey on the program satisfaction, implemented with the Qualtrics suite (Qualtrics, Provo, UT). The survey included a general evaluation on the group helpfulness on a Likert scale (1 = very helpful; 2 = helpful; 3 = quite helpful; 4 = not very helpful; and 5 = not helpful at all) and some open-ended questions on the use of the stimuli and the discussion, including pros and cons. Specifically, the open-ended questions were: “How did exercises and reflections impact your life?”; “How was this group helpful, if that was the case?”; “What were the aspects of the group that you mostly appreciated?”; “What were the aspects that you did not appreciate?”; and “What would you recommend we change, should we repeat this experience?.” The answers were assessed with another thematic analysis, following the same procedure previously described.

## RESULTS

### Group Activities and Participants

In the 5-week period of the intervention, there were a total of 28 posts, plus those dedicated to welcome the participants and asking to complete the final comments. Overall, there were 100 comments to the contents, made by 42 different participants, and 697 reactions. Of the 436 participants, 384 (88%) were female, with 266 (61%) ranging between 18 and 24 years, with 133 (30.5%) with an age between 25 and 34 years, and 37 people (8.5%) aged 35 or older.

### Analysis of the Interactions

The thematic analysis of the comments to the posts provided four key categories: “perspective changes to face the limitations,” “sharing discomfort,” “encouragement and support,” and “building a sense of community” (see **Table 1**). Participants’ IDs are reported in brackets.

**TABLE 1** | Categories from the analysis of the interactions.

Category	Definition	Example
<b>Perspective changes to face the limitations</b>	Reframing the meaning of the lockdown: from crisis to opportunity	<i>"I played board games with my family"</i> (#13)
<b>Sharing discomfort</b>	Expression of difficulties and negative emotions	<i>"I miss physical contacts with my loved ones..."</i> (#22)
<b>Encouragement and support</b>	Empathy and emotional support towards others' comments	<i>"I feel very close to you"</i> (#4)
<b>Building a sense of community</b>	Feeling of belonging and social recognition	<i>"We are all in the same boat"</i> (#13)

*Italics represent verbatim from the participants.*

### Perspective Changes to Face the Limitations

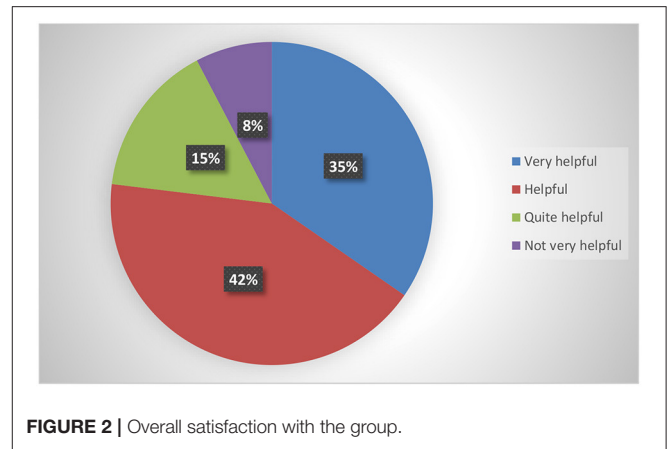
Comments included in this category referred to the shared strategies and to the attempts to change the perspective on the negative aspects of the lockdown. These contents explained how the students managed the restrictions of Covid-19 and their personal ways to adapt to change. The focus on the positive side of the condition emerged because they cognitively reframed the bad valence of isolation at home. In detail, the focus of attention switched from complaining about what it was not permitted to appreciating what they could do from home: *"I learned to do yoga"* (#2); *"I learned how to cook"* (#5); *"I spent time sunbathing on my balcony"* (#8). Many participants became aware of the importance to take a break from their previous busy life and enjoy more quality time with themselves and their family members (e.g., *"I played board games with my family,"* #13). Furthermore, several students stated that they often had video calls with friends and relatives whom they have been distant for long, as they would not generally meet in person.

### Sharing Discomfort

This category includes comments concerning difficulties and negative emotions experienced by the students during the quarantine. Many comments from this theme refer to nostalgic feelings for social proximity and emotional closeness: *"I miss physical contacts with my loved ones, which is a language itself"* (#22) and *"I miss hugging my grandparents"* (#36). Moreover, some members expressed a feeling of confusion and uncertainty, as *"I feel very sad and empty. The worst feeling is the constant perception of disorientation about my future. I get up every morning with no goals"* (#34) or *"In particular, all this uncertainty upsets me"* (#38).

### Encouragement and Support

The most common reactions in response to the shared discomfort were encouragement and support. Sometimes participants showed empathy and emotional support: *"I feel your difficulty"* (#33), *"I totally understand you, I feel very close to you"* (#4), *"You are not alone"* (#2), or *"My friends and I are facing similar problems"* (#21). Sometimes people gave practical advices: *"I created a game with my nephews that consists of sharing nice words*

**FIGURE 2** | Overall satisfaction with the group.

*to communicate how much we miss each other!"* (#29), or *"I write a thought on my diary every night. It is a good way not to forget what the present is teaching us"* (#20).

### Building a Sense of Community

The final category is populated by comments referring to the idea that students were building a sense of community and a form of social recognition: *"The first reason why we should feel closer is our common destiny: we are all in this together, we are facing the same restrictions, feeling the same fears and wishes"* (#24) or *"We are all in the same boat"* (#13). It is noteworthy to highlight that a great number of comments included both encouragement and a sense of community: *"It is in difficult times that we bring out the best in us!"* (#18), *"Most of us are struggling with this new situation because we are used to exerting control over events. However, the most important thing is adapting to a new routine, not to be pessimistic and appreciate simple things"* (#10), or *"Our mind is struggling because of anxiety and worry, but we shouldn't let this thing dividing us. What unites us is a sense of responsibility toward each other. For the first time, most of us are called to act not only for one's own sake, but especially for other's"* (#5). Another student said that *"The goal is not to sow panic by pointing out to each other, but to provide ideas and resources. One day I need you and the day after you need me, and I do anything possible to give you a starting point. This is beautiful"* (#32). It was also reported that feeling part of a large community while dealing with such a heavy catastrophe plays a significant role to fight loneliness.

### Post-intervention Survey

The post-intervention survey was completed by 25 participants. This self-selected sample was composed of 21 females (84%) and 4 males (6%), with an average age of 24.87 years. Of these, 6 (24%) declared to have commented at least one post, 12 (48%) reported that they interacted with "likes" or other reactions, and 7 (28%) only read the stimuli. Overall, 9 (35%) considered the program very helpful, 11 (42%) helpful, 4 (15%) quite helpful, and 2 (8%) not very helpful (see **Figure 2**).

Both exercises and stimuli were particularly appreciated, as they prompted an open perspective on the lockdown: *"They made me see a new point of view on the coronavirus-related limitations"*

(#9) or “*The group helped me to open up my mind*” (#18). Some students reported that the contents allowed them to manage their emotions: “*They toned down the perceived magnitude of certain events that seems hard to manage*” (#14) or “*It was helpful to see new opportunities and it allowed me to improve the management of my feelings*” (#17). Sometimes, participants shared the exercises and the reflections with other people outside of the group: “*I shared them with my relatives*” (#12), “*I used the exercises alone, but sometimes I discussed them with others, which made them more fun*” (#25). Together with the contents (e.g., “*Reflections and exercises have been very stimulating*,” #20), the group and the interactions have been particularly appreciated: “*I liked some original replies from the other group members*” (#9) or “*I appreciated the opportunity of supporting each other*” (#14). The limits that have been reported by the group members were focused on the limited ways of interaction (“*Sometimes, the discussion was limited*,” #6) and the fact that some contents were perceived as slightly repetitive (“*After a little while, contents got a little repetitive*,” #23). Finally, some suggested that the frequency of post publication was too intense (“*Maybe the contents were too frequent*,” #3).

## DISCUSSION

As a response to the psychological threat represented by the COVID-19 outbreak and its social implications, we developed a structured psycho-educational program, delivered through a private Facebook group for psychology students, to enhance cognitive flexibility, creativity, and openness. Once analyzed the interactions and the post-intervention feedback, it seems that these qualities have been positively impacted, at least for those who actively joined the discussion and provided feedback. The largest theme identified, in fact, is plenty of sentences that suggest that flexible and open new strategies have been proposed and adopted. This is also confirmed by the answers to the post-intervention questions. New perspectives and flexible thinking, as well as openness and creativity, seem to be the most referred problem-solving strategies. In particular, most stimuli aimed to help to reframe the challenges of the COVID-19-related situation, trying to see positive aspects and growing opportunities out of the lockdown and social restriction norms. These strategies were reported as successful in managing negative emotions and in promoting well-being, in line with previous findings from the literature (Kashdan and Rottenberg, 2010). In comparison with existing online psychological interventions (e.g., Chen, 2020; Wahlund et al., 2021), participating in this social community requires a limited time engagement, which may increase its generalizability.

Thinking flexibly and positively about these challenges does not mean to deny the stressful and perhaps depressive aspects of the outbreak, as already identified by other studies (Saita et al., 2021). Participants expressed their need to share emotions, in the search for recognition and acceptance. The reactions to these disclosures were highly accepting and supportive. Together with some creative strategies to face adversities, the

community responded with encouragement and recognition. The sense of community theme exemplifies the effects of these interactions, but it also describes the feeling that the whole human community has been affected. In line with this, it is worth noticing that some participants decided to practice the exercises and to share reflections with relatives and friends. In a sense, the slogan “*We are all in this situation together*” summarizes the feelings of connectedness, which may have grown despite the need for social distance (Ahmad et al., 2020). This pilot study supports the idea that the promotion of a mindful attitude, despite the psychological challenges posed by the outbreak and its social implications, can foster psychological well-being. This is in line with previous studies about interventions aimed to promote flexibility, openness, and mindful reframing (Garland et al., 2015). To our knowledge, this is the first work promoting this approach through social media and the first using it to face the psychological challenges of the COVID-19 pandemic.

Despite the coherence of these results and the clear narrative that arises from their interpretation, the study includes several limits. First of all, a comparison between the participants’ level of wellbeing pre- to post-intervention was not possible, since we did not measure any related construct neither before nor after the study took place. We only have data from those who interacted and replied to our stimuli and questions. We know nothing about the impact of the intervention on those who did not interact. We suggest that at least some of those who did not comment may be positively impacted by the training, for two reasons: Among those who responded to the final survey, the ones that reported no interaction expressed a positive view on the utility of the program; secondly, we have anecdotal evidence that some students, who did not engage group discussions, have found it helpful. However, it is hard to quantify the actual impact from the available data. Thirdly, generalization is problematic: The study was conducted in Italy, with students and alumni from a private academic institution, and focused on online data. Moreover, the obtained results refer to a self-selected group of psychology students and the responders to the survey were few, preventing more extensive quantitative analyses. Finally, to keep short the post-intervention survey, we did not collect many details about demographics and individual characteristics of the responders. Further data on different populations are therefore warranted.

## CONCLUSIONS

The study provides some insights on the potential for an intervention that promotes flexible thinking, openness, and creativity, as a way to deal with the outbreak and the lockdown. The intervention, in this case, is delivered through a widely used social media, which makes it extremely scalable and cost-effective. It requires the creation of a community, by using a private group, allowing participants to reply to each other, easing recognition and encouragement. Future studies should explore, in the context of the lockdown or other challenging situations, the effects

of the intervention with a controlled study and with a quantitative approach.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The study was reviewed and approved by Ethics Commission of the Department of Psychology at UCSC. The participants provided their written informed consent to participate in this study.

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## AUTHOR CONTRIBUTIONS

FP and AA designed the study and the intervention. EB managed the intervention, in collaboration with FP and AA. EM and ET, in collaboration with FP, conducted the analyses. FP drafted the manuscript and all authors integrated the text with additions and comments. All authors approved the final version of the manuscript.

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# Fatalism in the Early Days of the COVID-19 Pandemic: Implications for Mitigation and Mental Health

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This research assessed fatalism toward COVID-19 and its role in behavioral intentions to support mitigation efforts (e. g., social distancing) and mental well-being. A COVID-19 fatalism measure was developed, and a messaging manipulation (fatalistic vs. optimistic vs. no message) was created to examine causal links between fatalism scores. Support for mitigation efforts and negative affect (anxiety, fear, depression, and insecurity) were measured to examine the consequences of fatalism toward COVID-19. Results showed that the fatalistic messaging condition increased fatalism whereas the optimistic message reduced it. The effects of the messaging manipulation were also apparent in the downstream measures of support for mitigation and negative affect through the mediator of fatalism toward COVID-19. Specifically, fatalism negatively predicted intentions to support mitigation. Regarding mental health, fatalism was positively associated with depression but negatively associated with fear and insecurity. Implications for COVID-19 mitigation efforts and mental health in the face of the coronavirus pandemic are discussed.

**Keywords:** COVID-19, fatalism, social distancing, mental health, media messaging

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## FATALISM IN THE FIGHT AGAINST COVID-19: IMPLICATIONS FOR MITIGATION AND MENTAL HEALTH

On March 11th, 2020, the World Health Organization declared the COVID-19 outbreak a global pandemic (World Health Organization, 2020). In the 12 months that followed, more than 100 million people were infected and nearly 3 million people died (Worldometer, 2020). In the early days of this pandemic, most governments attempted to stop the spread of the virus by instituting lock-down measures and other mitigation protocols. Schools and businesses were closed, and people were asked to stay home as much as possible, practice social distancing when in public, and avoid large gathering or crowded environments (Centers for disease control prevention, 2020). Despite these efforts, the global spread of COVID-19 could not be contained.

As the death-toll from the pandemic rose, so too did the mental toll associated with mitigation efforts. Many people lost their job and faced severe financial strain (Mutikani, 2020; United States Department of Labor., 2020). Many more shifted to working from home, often in cramped urban apartment spaces, while also struggling to manage childcare and homeschooling (Cooney, 2020). Incidents of domestic violence increased (Taub, 2020). And more generally, people were forced to forego many of the things that typically provide meaning and purpose to life (e.g., social contacts, freedom of movement, sports and entertainment). To make matters worse, it quickly became apparent that this would likely be the new normal until a vaccine could be developed, which was estimated to take a year or more (Boyle, 2020).

Although the hardships and devastation of the pandemic would increase substantially as it wore on, the initial shock and disruption already seemed nearly impossible to manage during the early days. Rather than continue to struggle with mitigation efforts, we reasoned that many people would be willing to give up and submit to the deadly pandemic rather than fight against it. Given that most cases of COVID-19 are relatively mild, the appeal of letting go, and allowing the virus to wash through the population may have seemed more attractive than maintaining efforts to mitigate its spread. Plus, given the invisible nature of the virus (i.e., you cannot directly observe it in the environment), uncertainty regarding how it is transmitted (Han et al., 2020), and the delayed effects of mitigation efforts, it can be easy to become fatalistic and feel that nothing can be done to stop the virus from spreading. The purpose of the current research was to assess fatalism toward COVID-19 at a pivotal point in America's efforts to fight the virus—the first few weeks into the pandemic. Moreover, we aimed to examine the effect of different media messages on feelings of fatalism, and sought to gauge the consequences of COVID-19 fatalism on support for continued mitigation efforts and mental well-being.

## Fatalism Toward COVID-19

Fatalism is the belief that one's actions have little or no significant impact on important outcomes (Zimbardo and Boyd, 1999). People who are high in fatalism tend not to engage future-oriented planning, expend little effort in trying to achieve desirable goals, and are generally resigned to fate. In other words, they are willing to let external forces take over. Although the tendency to display fatalism is an individual difference, there are also situational circumstances that will promote fatalistic thinking independently of differences in personality. Indeed, fatalism may be particularly likely during the COVID-19 pandemic. Virus particles are invisible and easily transmitted from person to person. Those who contract the virus often have no idea where they became infected. Indeed, in some cases, transmission of the virus can happen in the absence of symptoms. The pandemic represents a powerful external force that can easily lead people to conclude that there is nothing they can do to influence the situation. In other words, they may feel that how the pandemic turns out is largely up to fate.

## Mental Health

When fatalism is pervasive, it tends to be strongly associated with depression and hopelessness (Seligman, 1975; Zimbardo and Boyd, 1999). However, fatalistic beliefs can also function to reduce the fear and anxiety aroused by insurmountable threats (Hayes et al., 2016; Lifshin et al., 2020). Struggling to control outcomes that appear intractable triggers anxious motivational conflict (Carver and Scheier, 1998; Gray and McNaughton, 2000), while choosing to let go of them can reduce this anxiety by eliminating the tension produced by wanting to control something uncontrollable (Rothbaum et al., 1982; Hayes et al., 2017).

With respect to COVID-19, mitigation efforts are difficult, costly, and have no clear end-date. Thus, becoming fatalistic in the fight against COVID-19 can be an attractive way of reducing

concerns about the pandemic. Indeed, recent work by Lifshin and colleagues suggests that people can become motivated to feel helpless against the virus to justify inaction and reduce anxiety (Lifshin et al., 2020). Importantly, however, we maintain that this method of palliation can also have broader negative consequences for mental health. When fatalism is extensive, it can promote depression and generalized disengagement from life (Hayes et al., 2016, 2017).

## Commitment to Mitigation Efforts

Another trouble with fatalism is that it reduces motivation and planful self-regulation (Hayes et al., 2016), which may be especially problematic vis-à-vis COVID-19 because it may undermine the principal means of addressing the pandemic—namely, social distancing. Becoming fatalistic about COVID-19 may lead people to ignore public health recommendations (e.g., “*we're all going to get this virus anyway, so why stay at home and suffer?*”), which is dangerous for the general public as well as the fatalistic individual as it increases the risk that they will become infected and spread the virus by not taking proper precautions. Understanding factors that contribute to COVID-19 fatalism, and how we can reduce these factors, is therefore imperative if collective mitigation efforts are to be successful.

## Media Messaging

One factor that may be particularly important in creating fatalism toward COVID-19 is the way in which it is presented in the media. Indeed, nearly every news story now appears related to the pandemic in some manner or another, and the information is often dire or shocking. While many of these messages seek to affirm the importance of collective action and the ironic sense of community that can come from social distancing for the well-being of others (e.g., #AloneTogether; Harrop, 2020), other messages often directly promote fatalism by claiming that the spread of the disease is inevitable (Slaughter, 2020). These messages often voice concern about the long-term economic impact of staying at home and shuttering businesses, suggesting that the cost associated with continued mitigation efforts is far greater than the cost of the virus (Hilton, 2020; Singer and Plant, 2020). U.S. President Donald Trump appeared to share these concerns when tweeting on March 23rd “WE CANNOT LET THE CURE BE WORSE THAN THE PROBLEM ITSELF” (Trump, 2020). Although these messages are very clearly anti-mitigation, we suspect they may be most effective in reducing support for mitigation efforts when they instill a sense of fatalism toward COVID-19. Indeed, fatalism and inaction go hand-in-hand.

## Study Overview

The purpose of the current research was to assess levels of fatalism toward COVID-19, to understand what factors influence this construct, and to examine the consequences of fatalism for mental health and support for COVID-19 mitigation efforts. Accordingly, we developed a self-report measure of fatalism toward COVID-19 and collected an online survey. To assess how COVID-19 fatalism can be causally influenced, we designed a fatalistic message arguing that the pandemic is unstoppable and

that mitigation efforts may do more harm than good (cf., Hilton, 2020; Singer and Plant, 2020; Slaughter, 2020; Trump, 2020). The fatalistic message intended to mimic those presented in the media or shared by prominent figures that the general public has been exposed to throughout the pandemic. For comparison, we created an optimistic message that emphasized the effectiveness of mitigation efforts and the connectedness that can come from tackling the pandemic collectively. We expected the fatalistic message to increase fatalism and the optimistic message to reduce it.

To assess the consequences of COVID-19 fatalism, at the end of the study we assessed support for mitigation efforts and negative emotionality. Regarding support for mitigation, we expected fatalism to be associated with reduced support for these efforts. Moreover, we hypothesized that our fatalistic and optimistic messaging conditions would influence support for mitigation by virtue of affecting self-reported feelings of fatalism (i.e., mediation). Regarding negative emotion, we expected fatalism to be positively associated with depression (Zimbardo and Boyd, 1999), but negatively associated with anxiety given evidence that fatalism in the face of insurmountable threats can reduce anxiety (Hayes et al., 2016; Lifshin et al., 2020).

## METHOD

### Participants and Design

In keeping with open science practices, we report all measures and manipulations included in the study. Full study materials are available online at <https://osf.io/sx7g2/>. We also explain how sample size was determined and report all data exclusions.

To determine minimum sample size requirements to confidently test our hypotheses, we conducted an a priori power analysis using G\*Power (Faul et al., 2007), and sought at least 80% power (with an alpha of 0.05) to detect a small effect (i.e.,  $f = 0.10$ – $0.24$ ;  $d = 0.20$ – $0.49$ ). The number of participants required to detect the lowest end of this range ( $f = 0.10$ ;  $d = 0.20$ ) using these criteria in a one-way ANOVA with three conditions yielded the highest estimate ( $N = 969$ ), so we strove to obtain a sample size that approximated this number.

Participants were 1,025 people recruited online through Amazon's Mechanical Turk. They were randomly assigned to one of three conditions in a between-subjects design. The only requirement for participation was United States residence. Exclusions included 149 participants who failed an attention check item asking them to leave a question blank (i.e., *Please do not answer this question, it is here to see if you are paying attention.*), 19 who did not correctly answer at least two (of four) multiple-choice questions about the contents of the article that they read, and six others for failing to complete all dependent variables for our main analyses. The total number of participants after exclusions was 851 (fatalistic  $n = 274$ , optimistic  $n = 291$ , no message  $n = 286$ ), which fell short of our sample size goal. Nevertheless, a *post-hoc* sensitivity analysis revealed that we retained 80% power to detect small effects ( $f = 0.11$ ,  $d = 0.21$ ; and 95% power to detect  $f = 0.13$ ,  $d = 0.27$ ), so we were confident in proceeding with our analyses without collecting more data. The final sample ranged in age from 18 to 78 ( $M_{\text{age}} = 41.0$ ,  $SD_{\text{age}} =$

14.0), and gender balance was roughly equal (female = 443, male = 391, other = 5, prefer not to disclose = 6).

### Measures and Procedure

The study was conducted on March 27th, 2020, 11 days into the initial mitigation period aimed at providing 15-days to slow the spread of the novel coronavirus (WhiteHouse.gov, 2020). The study was reviewed by an institutional research ethics board and was deemed to pose no more than minimal risk. Participants were informed that the study was an investigation of personality, attitudes, and opinions. They were not told that the purpose of the study was related to COVID-19 until the debriefing. Upon consenting to participate, respondents began by complete a series of demographic questions, followed by three brief personality questionnaires.

### Demographic and Personality Variables

Demographic items included age, gender, household income, education, and political orientation (among others, see online supplement for complete list of demographic items). We measured three personality factors that seemed like plausible candidates for influencing fatalism. Specifically, we assessed self-esteem (Rosenberg, 1965) and trait sensitivity to rewards and punishments (BAS and BIS; Carver and White, 1994) given that these variables influence reactions to threat (see Pyszczynski et al., 2004; Jonas et al., 2014). Exploratory analyses controlling for demographic and personality factors and exploratory tests of moderation are presented in the Supplementary Online Material (SOM; see <https://osf.io/sx7g2/>).

### Messaging Condition

Participants were randomly assigned to one of three messaging conditions. In the control condition, participants read no message and simply proceeded to a series of questions related to their attitudes and opinions about the COVID-19 pandemic. By contrast, those in the fatalistic and optimistic messaging conditions read a brief opinion piece before proceeding to these questions. The essays began with a threatening paragraph outlining the severity of the COVID-19 pandemic:

*COVID-19 is a killer. It has already killed more than 25,000 people worldwide and will likely kill many hundreds of thousands more. Making things worse, it is an invisible killer. We cannot see it, and we cannot even know when we have it on our hands. The only way that we know to keep it at bay is to stay away from each other. Social (or physical) distancing measures have been in place across the Western World for nearly 2 weeks. But the spread of COVID-19 rages on.*

For participants in the *fatalistic condition*, the essay went on to describe how social distancing can only be a temporary fix, and that the virus will remain problematic until we develop a vaccine, which will not happen for 18–24 months. The article then struck a fatalistic chord by asking whether people are truly willing to engage social distancing for 2 years. The author indicates that the virus is unstoppable and that he would rather let it run its course so that we can get back to normal sooner than later.



**TABLE 1** | Descriptive statistics for scale items assessing fatalism toward fighting Covid-19.

Item	Mean	SD	Skewness	Item-total Correlation
Staying home can make all the difference in the fight against covid-19*.	5.70	1.28	-1.35	-0.74
I can help to stop the spread of covid-19*.	5.52	1.32	-1.24	-0.73
I believe that helping to stop covid-19 is within my control*.	5.37	1.38	-0.97	-0.73
My actions can contribute to stopping the spread of covid-19*.	5.61	1.33	-1.27	-0.73
Since whatever will be will be, it doesn't really matter what I do to try to stop covid-19.	2.42	1.68	1.14	0.72
I have the ability to make decisions that will reduce the spread of covid-19*.	5.68	1.29	-1.39	-0.72
What I do now to fight covid-19 matters in the long run*.	5.64	1.36	-1.25	-0.71
I often feel that there is no point in even trying to stop the spread of covid-19.	2.43	1.69	1.09	0.70
It is within my power to help reduce the spread of covid-19*.	5.46	1.37	-1.13	-0.69
When thinking about tackling covid-19, I often think "why bother?"	2.35	1.66	1.24	0.68
My actions will make a difference in reducing the death-toll from covid-19*.	5.41	1.38	-1.13	-0.68
It doesn't make sense to worry about covid-19 because there is nothing that I can do about it anyway.	2.74	1.72	0.88	0.67
Social distancing is NOT a good way to fight covid-19.	2.17	1.52	1.49	0.66
There is no effective way to stop covid-19 from spreading.	3.03	1.68	0.75	0.60
Forcing people who are not sick into self-isolation will reduce the spread of covid-19*.	5.49	1.50	-1.11	-0.58
The spread of covid-19 is controlled by forces that I cannot influence.	4.06	1.73	-0.12	0.45

SD, Standard Deviation; Items followed with an asterisk (\*) are reverse-keyed.

Participants in the *optimistic condition* read an article that began with the same opening paragraph but then proceeded to argue that social distancing is effective. The author pointed toward China and South Korea as examples of its effectiveness. The message is optimistic but nevertheless realistic, suggesting that social distancing will not eradicate the virus but will buy time so that a vaccine can be developed within 18–24 months. The author concludes by indicating that he is willing to do his part to prevent the spread of the virus. Finally, he appeals to the togetherness that collective social distancing can offer (see SOM for the full text of both messaging conditions).

Participants in the fatalistic and optimistic conditions then proceeded to complete five simple reading comprehension questions that were included to ensure adequate processing of the message. Four of these questions were multiple-choice, whereas one was an open-ended item asking participants to indicate the overall theme of the article. Only participants who correctly answered at least two of the four multiple choice questions were retained for data analyses.

## Specific Worries

Next, participants completed a 7-item scale assessing their specific worries related to the COVID-19 crisis. These items were included for exploratory purposes. They assessed worries about death and finances for the self, close others, and strangers. The final item assessed concern for the economy (see SOM for exploratory analyses of these items).

## Fatalism Toward COVID-19

Participants then completed a 16-item scale assessing fatalism toward COVID-19 ( $\alpha = 0.94$ ; see **Table 1** for complete item-details; see SOM for factor analytic results and other exploratory

analyses). This was our main dependent variable, and consisted of seven positively keyed items ("Since whatever will be will be, it doesn't really matter what I do to try to stop COVID-19") and nine negatively keyed items (indicative of self-efficacy; e.g., "It is within my power to help reduce the spread of COVID-19"). Participants rated their agreement with each item using a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree).

## Behavioral Intention to Support Mitigation Efforts

Immediately after the fatalism questionnaire, we included an 11-item scale assessing behavioral intentions to support mitigation efforts ( $\alpha = 0.86$ , see SOM for complete item-details). Participants again responded using the 7-point scale. The items were geared predominantly toward intentions to engage social distancing (e.g., *I plan to keep my distance from others*) and to remain isolated (e.g., *I plan to stay isolated for as long as it is required*), but also assessed support for mitigation efforts more broadly (e.g., *I support lockdown efforts aimed at reducing the spread of COVID-19*).

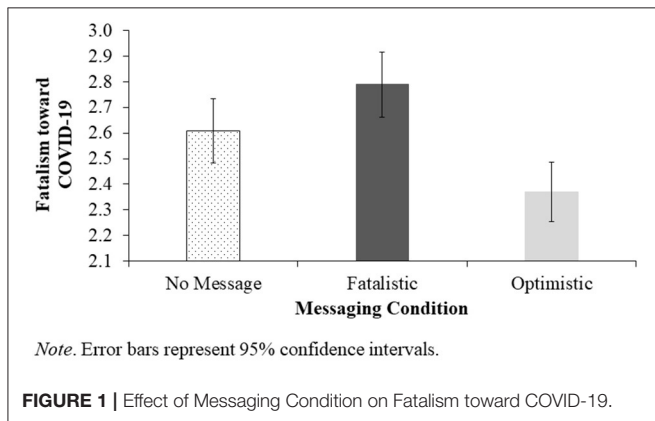
## Emotional Distress

Finally, after rating their support for mitigation efforts, participants completed a brief emotion measure to gauge their emotional well-being. The measure consisted of 20 items assessing four different emotions (5-items each): anxiety ( $\alpha = 0.84$ ), fear ( $\alpha = 0.95$ ), depression ( $\alpha = 0.93$ ), and insecurity ( $\alpha = 0.87$ ; see SOM for complete item-details). Although our hypotheses were specifically related to anxiety and depression, we included items assessing fear and insecurity for exploratory purposes. Participants rated the extent to which they were

**TABLE 2** | Descriptive statistics for dependent variables.

Dependent variable	Descriptive statistic			
	Mean	SD	Skewness	Reliability
COVID-19 Fatalism	2.58	1.07	0.76	0.94
Support for Mitigation Efforts	5.51	1.00	-0.79	0.86
Anxiety	2.98	1.44	0.46	0.84
Fear	2.62	1.67	0.90	0.95
Depression	2.69	1.66	0.84	0.93
Insecurity	3.77	1.44	0.01	0.87

SD, Standard Deviation; Reliability, Cronbach's  $\alpha$ .

**FIGURE 1** | Effect of Messaging Condition on Fatalism toward COVID-19.

currently experiencing these emotions using a 7-point scale (1 = not at all; 7 = very much). Upon completion, participants were thanked for their participation and fully debriefed.

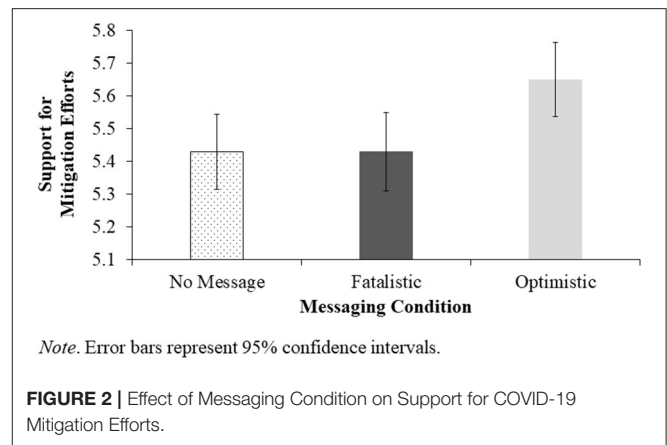
## RESULTS

Deidentified data and analysis script for all analyses reported below are available online at <https://osf.io/sx7g2/>. A document containing supplemental exploratory analyses that accompany the main findings can be found by following the same link.

Prior to beginning our analyses, we reversed scored negatively keyed items and computed scale means for each of our dependent variables. Descriptive statistics for the global sample are displayed in **Table 2**.

### Fatalism Toward COVID-19

To test our hypothesis about the effect of messaging condition on fatalism toward COVID-19, we conducted a one-way between-subjects ANOVA on the fatalism scores. Results showed a significant effect of condition,  $F_{(2,848)} = 11.16$ ,  $p < 0.001$ ,  $\eta^2 = 0.03$  (see **Figure 1**). Consistent with hypotheses, pairwise comparisons revealed that the fatalistic message increased fatalism relative to the no message control condition,  $t(848) = 2.04$ ,  $p = 0.041$ ,  $d = 0.17$ , whereas the optimistic message reduced fatalism relative to no message,  $t(848) = -2.68$ ,  $p = 0.007$ ,  $d = -0.22$ .



Note. Error bars represent 95% confidence intervals.

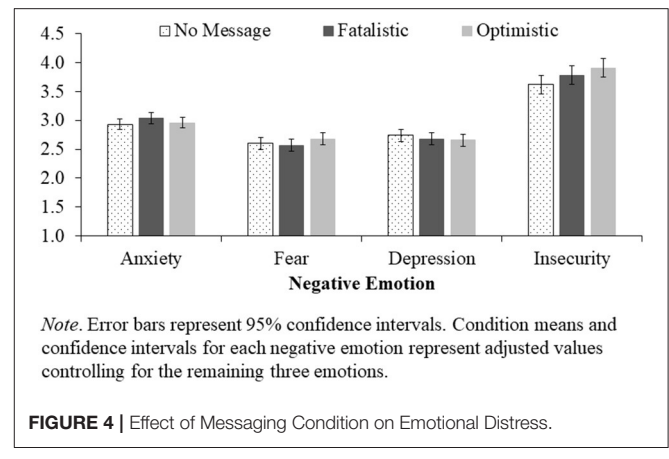
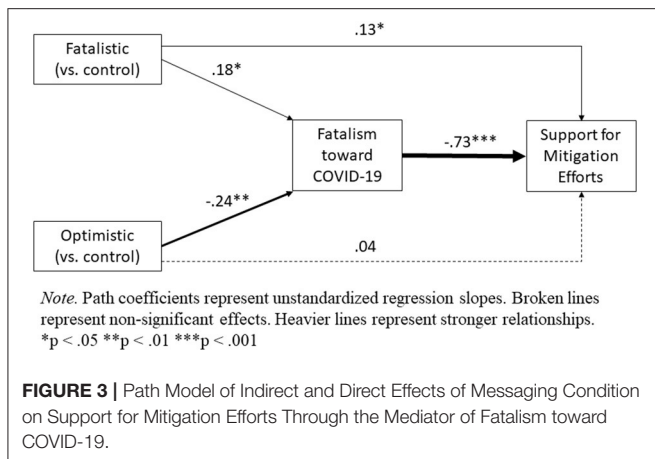
**FIGURE 2** | Effect of Messaging Condition on Support for COVID-19 Mitigation Efforts.

### Behavioral Intentions to Support Mitigation Efforts

Our next analysis examined the consequences of COVID-19 fatalism for behavioral intentions to support mitigation efforts. First, a bivariate correlation between these variables showed a highly significant association,  $r(851) = -0.78$ ,  $p < 0.001$ . Thus, higher levels of fatalism toward COVID-19 were associated with lower behavioral intentions to support mitigation efforts.

We also examined the effect of our messaging manipulation on support for mitigation efforts. A one-way ANOVA on support for mitigation with message condition as the independent variable revealed a significant effect,  $F_{(2, 848)} = 4.33$ ,  $p = 0.013$ ,  $\eta^2 = 0.01$  (see **Figure 2**). Pairwise comparisons revealed that whereas the optimistic message increased support for mitigation efforts relative to no message,  $t(848) = 2.57$ ,  $p = 0.010$ ,  $d = 0.21$ , the fatalistic message had no effect on support for mitigation,  $t(848) = -0.00$ ,  $p = 0.997$ ,  $d = -0.00$ .

Our main hypothesis regarding the effect of messaging condition on support for mitigation was that it would be mediated by fatalism toward COVID-19. Thus, we tested the indirect effect of our messaging manipulation on support for mitigation efforts through the hypothesized mediator of fatalism. Accordingly, we used Hayes' (2018) PROCESS macro to regress support for mitigation on messaging condition (dummy-coded to compare the fatalistic message with control in code 1 and the optimistic message with control in code 2) through the mediator of COVID-19 fatalism (Model 4, 5,000 bootstrap resamples). This analysis showed that the fatalistic message reduced support for mitigation indirectly by increasing fatalism toward COVID-19,  $b = -0.13$ , 95% confidence interval (CI) [-0.266, 0.003], whereas the optimistic message increased support for mitigation by reducing fatalism,  $b = 0.17$ , 95% CI [0.051, 0.299]. After accounting for these indirect effects, messaging condition still exerted a significant direct effect on support for mitigation efforts,  $F_{(2, 847)} = 3.31$ ,  $p = 0.037$ ,  $\eta_p^2 = 0.003$ . Interestingly, pairwise comparisons showed that whereas the direct effect of the optimistic message was not significant,  $t(847) = 0.77$ ,  $p = 0.443$ ,  $d = 0.04$ , the fatalistic message now revealed a significant direct effect,  $t(847) = 0.252$ ,  $p = 0.012$ ,  $d = 0.13$ , such that participants



**TABLE 3 |** Bivariate correlations among fatalism and negative emotions.

Variable	1	2	3	4
Anxiety (1)	–			
Fear (2)	0.80***	–		
Depression (3)	0.79***	0.81***	–	
Insecurity (4)	0.26***	0.27***	0.33***	–
Fatalism	0.07	0.02	0.09**	–0.05
Fatalism (partial correlations)	0.04	–0.10**	0.12***	–0.08*

Partial correlations with fatalism (bottom line) represent relationships between fatalism and each negative emotion while controlling for the other three. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

increased their support for mitigation efforts after reading the fatalistic message relative to no message (see **Figure 3** for a full path model).

### Emotional Distress

Finally, we examined the emotional consequences of fatalism toward COVID-19. Bivariate correlations between fatalism and each of the negative emotions measured in the study are presented in **Table 3**. Given research showing divergent unique associations between fatalism and anxiety and depression when these highly correlated negative emotions are covaried for each other in statistical analyses (see Hayes et al., 2016; Hayes and Hubley, 2017), we also examined partial correlations between fatalism and each negative emotion controlling for the others in **Table 3**. In summary, although the overall correlations show only a significant positive association between fatalism and depression, the partial correlations also show significant *negative* associations between fatalism and fear and insecurity.

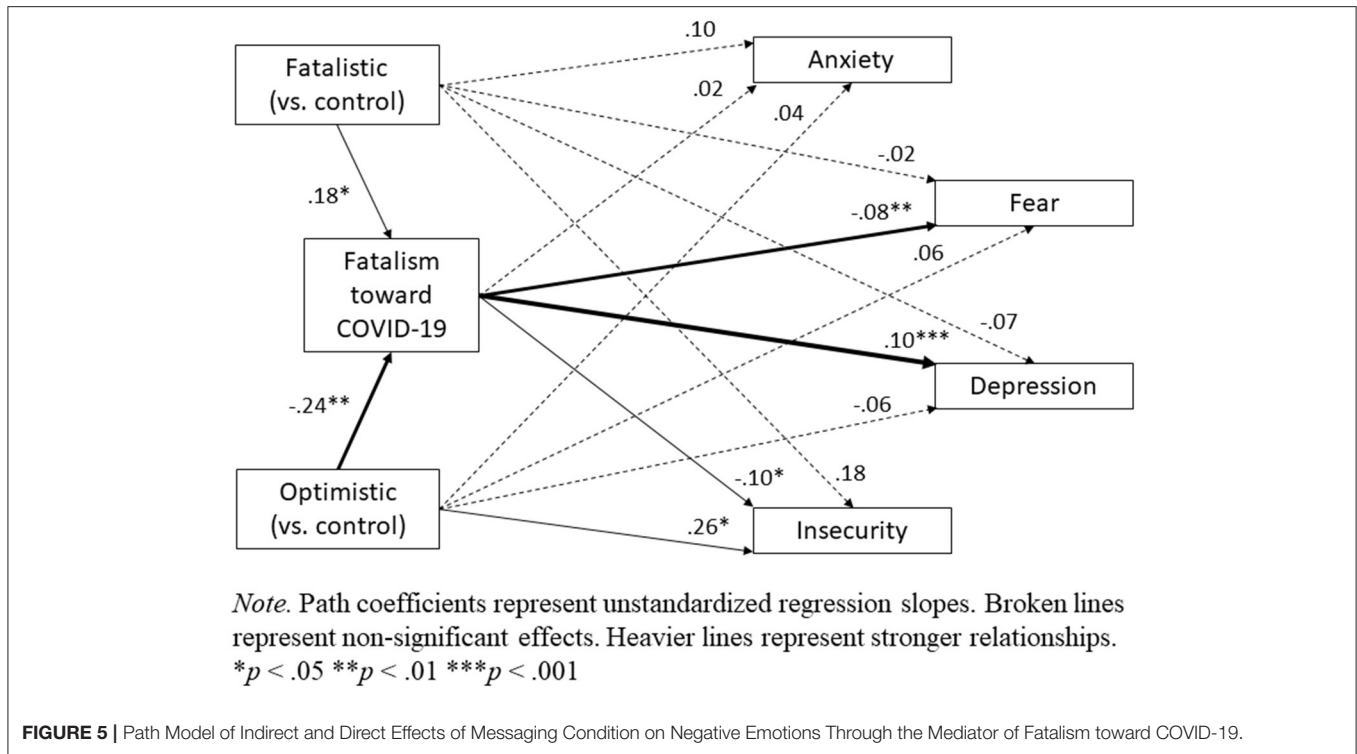
To examine the effect of messaging condition on negative emotionality, we first conducted four separate ANCOVAs on each emotion while controlling for the other three (removing the covariates did not affect these analyses, but see SOM for results without the covariates). These analyses revealed a significant effect of messaging condition on insecurity,  $F_{(2, 845)} = 3.21$ ,  $p = 0.041$ ,  $\eta_p^2 = 0.01$ , such that the optimistic message increased insecurity relative to no message,  $t(845) = 2.52$ ,  $p = 0.012$ ,  $d = 0.21$ , but the fatalistic message did not,  $t(845) = 1.43$ ,  $p = 0.155$ ,  $d = 0.12$ . There were no overall effects of condition for anxiety,

$F_{(2, 845)} = 1.33$ ,  $p = 0.266$ ,  $\eta_p^2 = 0.00$ , fear,  $F_{(2, 845)} = 1.14$ ,  $p = 0.320$ ,  $\eta_p^2 = 0.00$ , or depression,  $F_{(2, 845)} = 0.61$ ,  $p = 0.545$ ,  $\eta_p^2 = 0.00$  (see **Figure 4**). Nevertheless, given the significant effect of condition on fatalism and the significant partial correlations between fatalism and three of the four negative emotions, we tested for indirect effects of messaging condition on each emotion through the mediator of fatalism (as we did for support for mitigation) using Hayes’ (2018) PROCESS macro (Model 4, 5,000 bootstrap resamples). A full path model is displayed in **Figure 5**, and indirect effects are summarized in **Table 4** (see SOM for this analysis without the covariates). Overall, this analysis showed that by increasing fatalism toward COVID-19, the fatalistic message indirectly reduced fear and insecurity, but increased depression. The opposite pattern emerged for the optimistic message. By reducing fatalism toward COVID-19, the optimistic message indirectly increased fear and insecurity, but reduced depression.

### DISCUSSION

The results were generally consistent with our hypotheses. They offer insights into the role of fatalism in the early days of the COVID-19 pandemic and show how media messaging may have influenced support for virus mitigation efforts and overall mental health.

First, as anticipated, the fatalistic message increased fatalism toward COVID-19 while the optimistic message reduced it. Results for behavioral intentions to support mitigation efforts were partially consistent with hypotheses. As predicted, the optimistic message increased support for mitigation, and fatalism toward COVID-19 mediated this effect. However, the fatalistic message showed no overall effect on support for mitigation. Nevertheless, consistent with hypotheses, this message reduced support for mitigation indirectly by increasing fatalism toward COVID-19. Interestingly, after accounting for this indirect effect, we found that the fatalistic message increased support for mitigation directly (see **Figure 3**). This pattern explains why the fatalistic message had no overall effect on support for mitigation—suggesting that the message produced two opposing effects (a suppression effect). Whereas, some people became



**FIGURE 5 |** Path Model of Indirect and Direct Effects of Messaging Condition on Negative Emotions Through the Mediator of Fatalism toward COVID-19.

**TABLE 4 |** Indirect effects of messaging condition on negative emotions through COVID-19 Fatalism.

Message Condition	Outcome	Effect	Boot SE	Boot LLCI	Boot ULCI
Fatalistic (vs. control)	Anxiety	0.004	0.006	-0.004	0.022
	Fear	-0.015	0.009	-0.040	-0.002
	Depression	0.018	0.010	0.002	0.044
	Insecurity	-0.018	0.013	-0.056	-0.001
Optimistic (vs. control)	Anxiety	-0.006	0.007	-0.024	0.006
	Fear	0.019	0.010	0.004	0.045
	Depression	-0.023	0.012	0.004	-0.006
	Insecurity	0.024	0.015	0.003	0.063

All indirect effects represent unstandardized regression coefficients. Boot, Bootstrapped; SE, Standard Error; LLCI, Lower Level Confidence Interval; ULCI, Upper Level Confidence Interval. Confidence intervals represent 95% CIs, thus intervals that do not contains zero are significant at the  $p < 0.05$  level.

fatalistic and thus less supportive of mitigation efforts, others reacted against the message by increasing their support for mitigation. This pattern may be indicative of reactance (Brehm, 1966), wherein people respond to external pressure by asserting their freedom and control. Although this interpretation would suggest that some identifiable moderator could predict who responded to fatalistic media messages with reactance (vs. fatalism), we found no significant moderators of this relationship in our data (see SOM for exploratory analyses). With that said, we included only a small number of personality scales in our study (self-esteem, BAS/BIS sensitivity). Future research could examine alternative personality factors (e.g., agreeableness), or other individual differences (e.g., personal experience or prior knowledge of viral epidemiology) that might moderate responses to fatalistic messages.

Fatalism toward COVID-19 also showed associations with emotional distress, and messaging condition evinced significant indirect effects on negative emotionality by influencing fatalism. First and foremost, fatalism was positively associated with depression. However, when controlling for the other negative emotions assessed in the study, fatalism was also negatively associated with fear and insecurity. These associations are only partially consistent with expectations. We hypothesized a positive association for depression given the withdrawal-oriented nature of fatalistically abandoning efforts to engage personal control (which was supported), but a negative association with anxiety given that fatalism can offer defense against intractable threats (Hayes et al., 2016). Results showed no associations between fatalism and anxiety (with or without the covariates). But the associations of fatalism with fear and insecurity may be consistent



with our hypothesis that fatalism is an attempt to cope with the intractable nature of the pandemic. In retrospect, anxiety should be most likely when examining distant or abstract threats where the possibility of negative outcomes is highly uncertain (McNaughton and Corr, 2004). While this may have applied to the early days of the pandemic, it is only conceivable that most people saw COVID-19 as a clear and present danger. If so, it would be reasonable to expect fear-related emotions (Greenberg et al., 1997; McNaughton and Corr, 2004). These results would need to be replicated to ensure that they are reliable, but the associations with fear and insecurity are at least partially consistent with our expectation that fatalism toward COVID-19 offers a means of reducing concerns about the pandemic.

One aspect of the results that was not anticipated was the effect of the optimistic message on feelings of insecurity (see **Figure 4**). Results from the mediational analysis suggest that part of this effect is attributable to reduced feelings of fatalism (which is consistent with our theorizing about the relationship between fatalism and pandemic concerns), but the direct effect shows that the optimistic message increased feelings of insecurity even after controlling for the influence of fatalism (see **Figure 5**). One possible interpretation for this effect is that people who read the optimistic message became more vigilant about their health-status. They may have become less confident that they were safe and healthy, for instance, and more guarded against contracting the virus and potentially transmitting it to others. From this perspective, feelings of insecurity may be somewhat adaptive during a pandemic. While feeling insecure is no doubt emotionally taxing and likely difficult to maintain for extended periods, a certain level of distress may be necessary to remain vigilant against infection. Future research could investigate this possibility more directly.

## Implications for COVID-19 Mitigation

The results of the current study have important implications for ongoing efforts to mitigate the spread of COVID-19 by suggesting a pivotal role for fatalism. Indeed, several studies now show that fatalistic thinking reduces behavioral intentions to follow public health advice aimed at mitigating the spread of COVID-19. More specifically, high belief in predetermination (Özdil et al., 2021), exaggerated estimates of the infectiousness of the virus (Akeşon et al., 2020), and the tendency to automatically associating the virus with death (Jimenez et al., 2020) have all been found to be associated with an unwillingness to follow mitigation protocols (see also Bogolyubova et al., 2021). In essence, people are unlikely to engage mitigation efforts unless they believe COVID-19 can be eradicated by such efforts and that their actions (e.g., social distancing, staying at home) are needed to stop the virus.

The current study suggests that media messaging plays an important role in affecting mitigation efforts by virtue of influencing fatalism toward COVID-19. Messages that paint a bleak picture of the pandemic, or suggest that it may take years to end (if it will end at all) may undermine support for mitigation efforts by promoting fatalism (cf., Briscese et al., 2020). Ironically, such messages may ultimately serve to prolong the pandemic and increase its severity by discouraging adherence to public

health guidelines. By the same token, our results also suggest that messaging about the virus can be an important means of reducing fatalism and thereby increasing support for mitigation. Pro-mitigation messages that are inherently anti-fatalistic by drawing clear connections between individual actions and the spread of the virus have been shown to increase intentions to practice social distancing (Lunn et al., 2020). Moreover, messages that promote a duty to care for others (Everett et al., 2020) have also been found to be effective in promoting adherence to mitigation protocols, and these too may function in part by reducing fatalism (see SOM for associations between concern for others, fatalism, and support for mitigation).

## Implications for Mental Health

The current research also has implications for understanding the mental health consequences of the pandemic. Numerous studies have found increased prevalence of psychological disfunction stemming from the pandemic (e.g., Bo et al., 2020; Choi et al., 2020; Forte et al., 2020; Gallagher et al., 2020; Hyland et al., 2020; Salari et al., 2020; Shevlin et al., 2020). These studies point toward elevated levels of anxiety, depression, and trauma. The pandemic not only poses a threat to our physical health, but also increases the burden of everyday life while sapping the financial and psychological resources needed to cope with this burden. Indeed, people with direct personal experience with the disease (e.g., Forte et al., 2020; Gallagher et al., 2020), low or reduced income (e.g., Hyland et al., 2020; Shevlin et al., 2020), and those who are alone or detached from loved ones (e.g., Horesh et al., 2020; Parlapani et al., 2020) are among those reporting higher levels of psychological distress during the pandemic.

Studies suggests that at least some of the mental distress triggered by the pandemic stems from feelings of fatalism toward COVID-19. Specifically, Ngien and Jiang (2021) found that COVID-19 fatalism was positively associated with stress among Chinese youth, and Bogolyubova et al. (2021) found that fatalism predicted post-traumatic stress symptoms in an international sample. In the current study, we found that fatalism toward COVID-19 was positively associated with depression. Moreover, we found that media messaging can influence depression by affecting fatalism. In fact, our fatalistic message was partly inspired by extent media messages, including Donald Trump's tweet about the cure being worse than the disease. At the time of data collection (March 27th), the possibility that President Trump would forgo restrictions and allow the virus to go unmitigated to save the economy appeared real. We reasoned that this anti-mitigation rhetoric may be effective in reducing support for mitigation, but suspected it would also promote depression and despair by causing many people to feel fatalistic about the pandemic. Our results support this reasoning. And moreover, the data also show that optimistic media messaging can reduce feelings of depression by reducing fatalism toward the COVID-19 pandemic. Ngien and Jiang (2021) observed similar results showing that social media use reduced pandemic stress by virtue of reducing feelings of fatalism. Thus, the mental well-being of people who consume media related to the pandemic may hinge in part upon the extent to which the message makes them feel fatalistic (vs. powerful and effective) toward the virus.

Our data also add complexity to the mental health picture by showing that fatalism toward the pandemic can offer protection against fear and insecurity. These results are consistent with research by Özdil et al. (2021) who found that fatalistic beliefs relating to predetermination and luck were negatively associated with fear of COVID-19. Similarly, Lifshin et al. (2020) found that extremely high levels of helplessness toward becoming infected were associated with lower levels of anxiety. Thus, believing that nothing can be done to stop the virus or to prevent oneself from being infected precludes the need to worry about it. Indeed, we maintain that this is the inherent appeal of fatalism in response to intractable threats such as the COVID-19 pandemic. However, fatalism should not be viewed as a healthy solution to the problem. Indeed, the evidence suggest that fatalism is associated with reduced intentions to follow public health advice—behavior that poses a risk to oneself and others. Moreover, even the evidence suggesting that fatalism is associated with lower fear and anxiety shows that this is not without caveats. For instance, Özdil et al. (2021) found that at least one facet of fatalistic (pessimism) was associated with *more* fear of COVID-19. This may help to explain why we only found a negative association between fatalism and fear after controlling for other negative emotions (such as depression, which is strongly associated with pessimism). Likewise, Lifshin et al. (2020) found that moderate (vs. low) levels of helplessness were associated with *increased* anxiety (i.e., the relationship between helplessness and anxiety was curvilinear). According to Lifshin et al. (2020), moderate levels of helplessness may be associated with feeling overwhelmed by difficult circumstances that exceed one's capacity for control whereas extremely high levels of helplessness can offer relief from anxiety because there is truly nothing that can be done.

In our view, fatalism toward a specific phenomenon that is truly impossible to control can be an adaptive response under the circumstances. The trouble occurs when people turn to fatalism too quickly or the fatalistic giving-up process is too extensive (see Hayes et al., 2017). Becoming fatalistic too quickly can lead people to miss the chance to control something that ultimately *can* be controlled. In the context of COVID-19, fatalism in the first few weeks of the pandemic may have led humanity to miss the opportunity to minimize the global impact of COVID-19. Moreover, given what may be lost by giving-in to a pandemic (the health and survival of oneself and those to which one is connected), fatalism in the context of COVID-19 may be quite extensive and could trigger generalized fatalism that leads to severe depression and other mental health issues. Whatever the case may be, it appears that the emotional correlates of fatalism toward COVID-19 are complex and multifaceted. Future research should continue to investigate the role of fatalism in mental health outcomes to the pandemic and beyond.

### Important Limitations

Although this research is largely supportive of our hypotheses, it also has several important limitations. First, the size of the effects of our manipulation on COVID-19 fatalism, support for mitigation efforts, and emotional well-being are quite small. Indeed, according to rules of thumb for gauging the size of a standardized effect (Cohen's *d*), nearly all effect sizes observed in

this study were small ( $< 0.49$ ) or very small ( $< 0.20$ ). These effects were detected as significant due to a relatively large sample size. Nevertheless, what may begin as a small effect at the beginning of a pandemic may snowball into much larger effects as time passes.

Second, the measures that we employed to test our hypotheses were not standardized instruments. It is therefore difficult to compare the scores observed in the current study with comparable scores in the existing literature. Did participants in our sample report particularly high levels of fatalism? Likewise, were the depression scores observed in our sample indicative of clinical depression or normal sadness? The reason that we did not use standardized measures of fatalism or support for mitigation efforts was that none existed at the time of data collection. Even now it is hard to know if the observed values are relatively high or low. Nevertheless, we can gain some perspective on the level of negative affect reported in the current study by comparing the current data to pre-pandemic studies in our lab that used similar methodology. For instance, Hayes and Hubley (2017) assessed anxiety and depression with the same items used in the current research (in addition to several others). Mean scores for anxiety were significantly higher in the current sample ( $M = 2.98$ ;  $SD = 1.44$ ;  $n = 851$ ) than they were on the same items prior to the pandemic ( $M = 2.03$ ;  $SD = 1.40$ ;  $n = 204$ ),  $t(1,053) = 8.45$ ,  $p < 0.001$ ,  $d = 0.66$ . Likewise, scores on the depression items were also significantly higher in the current sample ( $M = 2.69$ ;  $SD = 1.69$ ;  $n = 851$ ), than before the pandemic ( $M = 2.07$ ;  $SD = 1.67$ ;  $n = 204$ ),  $t(1,053) = 4.82$ ,  $p < 0.001$ ,  $d = 0.38$ . Thus, the levels of anxiety and depression reported in this study are significantly above what we have observed in our previous research. This is consistent with several studies that *did* use standardized measures and also found increased anxiety and depression in response to the pandemic (e.g., Hyland et al., 2020; Özdin and Özdin, 2020; Shevlin et al., 2020). To provide further contextualization to the depression scores in our sample, Hayes and Hubley (2017) also assessed depression using the CESD-10 (Andresen et al., 1994) together with the same 5-items used to assess depression in the current study. Scores on the 5-item state depression scale were highly correlated with scores on the CESD-10 in this previous study,  $r(204) = 0.76$ ,  $p < 0.001$ . As such, while we cannot offer firm conclusions about the severity of negative affect observed in this study, the available evidence suggests that participants were experiencing abnormally high levels of anxiety and depression.

### CONCLUSION

The COVID-19 pandemic has been a shock to nearly everyone on the planet. The early stages may have been among the most stressful and uncertain. The threat of potential infection and death coupled with seemingly irreparable disruptions to nearly every aspect of everyday life represents a burden of momentous proportions. The current research suggests that fatalistically giving up may have helped to quell some of the fear and insecurity aroused by the pandemic. Feeling that one cannot possibly change the situation may offer some relief from a situation that demands constant vigilance and control. But fatalism is also strongly associated with depression, so fatalistically withdrawing

from efforts to cope with the pandemic is not without emotional costs (cf., Hayes et al., 2016).

Critically, fatalism toward COVID-19 was also found to promote giving up on public health regulations that function to protect oneself and others. Fatalism in the face of COVID-19 is thus self-destructive and a public health liability. Unfortunately, media messages—some of which came directly from prominent authority figures—only served to promote fatalism in the early stages of the pandemic. The cost of early failures to mitigate the spread of a deadly virus cannot be overstated.

When faced with future pandemics, the current research suggests that early interventions aimed at preventing (rather than promoting) fatalistic thinking might be among the most important means of promoting adherence to mitigation protocols and reducing depression. Recognizing that people may be drawn toward fatalism to reduce fear and insecurity might be equally important. Offering alternative means of coping with these negative affective states—with public policy and/or consistent optimistic media messaging—may be an effective means of preventing fatalism from taking hold.

## DATA AVAILABILITY STATEMENT

The dataset presented in this study can be found in an online repository: Open Science Framework, <https://osf.io/sx7g2/>.

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## ETHICS STATEMENT

This study was reviewed and approved by the Acadia University Research Ethics Board. Participants provided informed consent prior to participating in the study.

## AUTHOR'S NOTE

The materials used in the study, as well as supplemental data analyses are publicly available at <https://osf.io/sx7g2/>. De-identified data and analysis script are also posted at the same link.

## AUTHOR CONTRIBUTIONS

JH and LC developed the study concept. JH designed the study, and LC provided critical feedback. Data collection, analysis, and interpretation was performed by JH. LC performed an extensive review of the literature. JH drafted the manuscript, and LC provided critical revisions. All authors approved the final version of the manuscript for submission.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Leveraging Technology for the Wellbeing of Individuals With Autism Spectrum Disorder and Their Families During Covid-19

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## INTRODUCTION

Recently, the need for a mental health technology revolution during COVID-19 was noted (1). These authors suggested that interventions should be targeted toward vulnerable groups and adapted to their individual needs (1), and we have expanded this concept here. One vulnerable group that will benefit from such a technology revolution and targeted interventions comprises individuals with Autism Spectrum Disorder (ASD). We discuss how technology can be leveraged to address the specific challenges experienced by these individuals and their families during the pandemic.

## USING TECHNOLOGY FOR FAMILIES WITH ASD DURING THE PANDEMIC

One way technology can be used during the pandemic for families with ASD is through telehealth, which refers to providing various remote services electronically, such as patient care, education, and monitoring (2). Relatedly, telemental health is the utilization of information and communication technologies to remotely provide mental health care, evaluations, and therapy (3). Telemental health is viewed as a valuable tool during COVID-19 as it can effectively respond to the mental health needs of individuals in isolation or with restricted mobility while minimizing infection risk and, therefore, can be an option to provide care without interruptions and with adherence to social distancing (3).

## Remote Intervention Administration to Parents and Children

Attempts at using technology for remote service delivery to families with ASD predate the pandemic. One study focusing on parent coaching instead of a direct intervention with children with ASD showed that parents, service providers, and ASD specialists perceived remote technologies to be helpful by improving the skills of the parents; reducing cost, time, and travel; providing flexible, ongoing, and regular support; and allowing families to access support from their home. At the same time, this remote coaching often resulted in frustration due to technical difficulties, and it was agreed that remote technology should not replace face-to-face contact but only augment it (4). Therefore, overcoming such frustrations to harness the provided advantages will be important in refining remote parent coaching for families with ASD.

Another study exploring this possibility before the pandemic focused on web-based training and telemedicine to train parents to implement the Applied Behavior Analysis (ABA) strategies with their children. This program was beneficial in increasing parents' knowledge of the ABA strategies and their implementation (5). These findings are corroborated by a systematic review of a remote parent-mediated intervention training yielding a preliminary evidence of improved parental knowledge and social behavior and communication skills of children with ASD (6). In terms of the remote interventions for children with ASD, one hopeful finding shows that children with ASD who received remote support and those who received face-to-face support did not significantly differ in terms of the gains they made in terms of social communication as measured by initiations of joint attention and requesting (7). Such protocols can be exploited during COVID-19 to remotely provide interventions to children with ASD and to provide training to their parents to implement validated intervention strategies at home.

A web-based parent training tutorial to enhance interactions was found by parents to be user-friendly and easy to understand. They reported that the tutorial increased their knowledge about how to communicate with their child and that they felt comfortable to apply these techniques to their communication with their child (8). Another program for parents included live distance coaching sessions, in addition to online activities and interactive tutorials, on how to use the ABA procedures to teach new skills, generalize them to other settings, and reduce challenging behavior (5). This program resulted in gains in the parents' knowledge and ABA implementation skills that were independent of their educational background.

One instance of telemental health administration for families of individuals with ASD was recently started in Italy by a group of professionals *via* online observations and discussions with families they had been consulting with since before the lockdown (9). They coached parents on structuring the entire day for their children with ASD and their siblings, selecting contextually appropriate activities, and setting up a positive reinforcement system at home. The researchers observed that many parents were able to implement these effectively, bring order to their homes, and help their children be happy, calm, productive, and engaged (10).

Using remote intervention techniques for families with ASD to supplement face-to-face interventions would be ideal, as would using both online tutorials and live distance coaching sessions. Yet, when the available resources do not allow for these ideal conditions, using web-based tutorials to disseminate knowledge to parents of children with ASD can provide them with resources to more successfully handle the difficulties of pandemic conditions for their families.

## Remote Psychological Counseling

In addition to providing interventions and parent training remotely, technology may enable remote psychological counseling for families with ASD. Because of various limitations that prevent these families from receiving full-time psychological

services, it has been suggested that remote counseling may emerge as the only available alternative support for some families of children with ASD (9). For a successful online counseling for these families, it has been recommended that the family environment of the child should be taken into account, the consultation provider should be a professional, interventions should have measurable characteristics, and face-to-face interactions with the child with ASD should be possible (9). Though these recommendations may better apply to non-pandemic conditions, they can nonetheless be established during COVID-19 as well by using videoconferencing for the face-to-face interactions and ensuring the other conditions for the counseling process. It has been noted that, although, ideally, teletherapy should not replace in-person services, it does become necessary when no other comparable service option is available (11), which may be the case during the pandemic for many families with ASD.

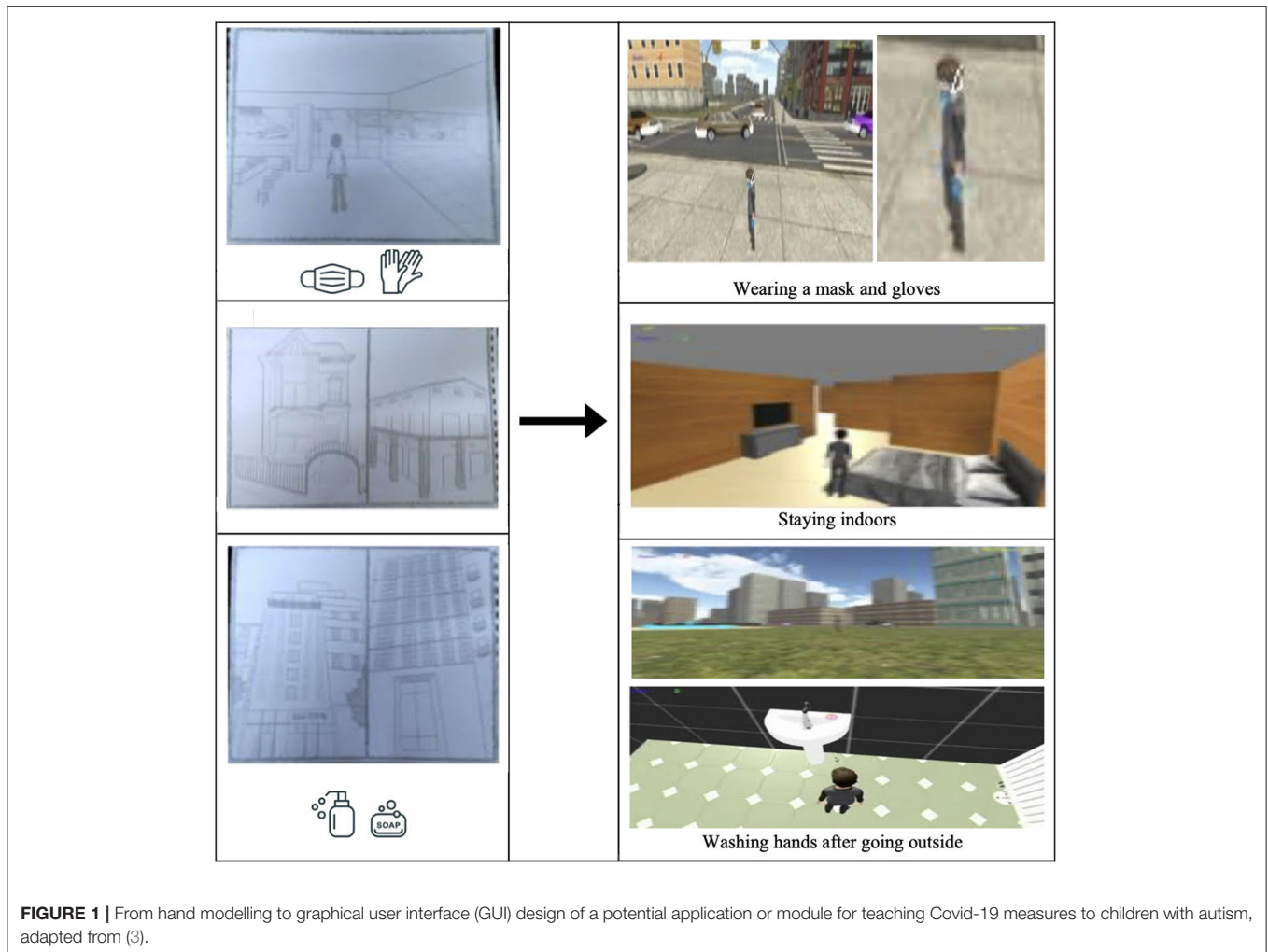
## Social Connectedness

Another way technology can be used during the lockdown is for social connectedness. There is evidence from a sample of adults with ASD that the majority of that sample of 108 adults used social networking sites, and the most commonly given reason for this was for social connection. However, decreased loneliness was not specifically associated with social media use but was associated with offline friendship's quality and quantity (12). In line with this, during the pandemic conditions, the ability and prevalence of social media utilization by individuals with ASD should not be assumed to be enough to alleviate their feelings of loneliness. Therefore, other programs geared toward fostering virtual interactions could be implemented by autism communities and foundations to assist with forming such connections.

## Mobile Applications

Embracing the suggestion that digital mental health tools should be affordable, accessible, and appropriate for all individuals (1), we discuss how technological applications can be used to address two fundamental adversities faced by individuals with ASD during COVID-19: understanding and following the measures necessitated by COVID-19 and continuing special education during the implemented lockdown and social distancing measures.

Firstly, using technology to help individuals with ASD comprehend and follow the COVID-19-related measures is important, as our study showed that 75% of the parents of children with ASD reported that their children did not understand properly, or understood only to a medium degree, the COVID-19-related measures and necessities, such as staying home or social distancing (13). When asked if they were using a resource with their children that explained what COVID-19 is and what needs to be done, 80% said no, and 85% said that they would want such a resource for children with ASD and if it existed, they would use it (13). For this purpose, our Crises and Disasters Management Game (CDMG) (14) can be adapted following the guidelines for developing computer games for



**FIGURE 1** | From hand modelling to graphical user interface (GUI) design of a potential application or module for teaching Covid-19 measures to children with autism, adapted from (3).

children with ASD (15). CDMG is a simulation game for man-made crises (e.g., fires) and natural disasters (e.g., earthquakes). In this game, the players lose points for engaging in behaviors that can cause or exacerbate crises. By experiencing different scenarios, such as that of an indoor fire, players learn how to safely navigate through crises and disasters. Being a simulation game, CDMG is a safe and cost-effective choice that presents no danger or risk to players. Given these properties, CDMG can be adapted to help children with ASD keep safe during the COVID-19 pandemic. For instance, the new addition of a COVID-19 safety precautions scenario can teach children with ASD how to take personal protection precautions such as staying home and washing their hands. Children with ASD may, in turn, gain points and receive reinforcers as they do so, which are the commonly used behavior modification methods in special education.

Another scenario can simulate safety measures outside, where children can select to use masks, gloves, and other hygienic products, such as alcohol-based disinfectants, and gain points as they abide by these measures (see **Figure 1**). The rules for designing softwares for children with ASD (15) can easily be implemented in the CDMG game. For instance, since

children with ASD prefer reliable routines and predictable environments, the game interface can be kept as simple as possible with a low differentiation between global and local cohesion. Such accommodations can make the new scenarios added to this game to be ASD-friendly and present a safe and fun environment for them to practice the COVID-19-related measures, which will reinforce these behaviors with rewards and points and increase their likelihood of being applied in real life.

Secondly, special education for individuals with ASD is halted due to the lockdown and social distancing measures necessitated by the pandemic. Although mainstream education can continue *via* distance education for typically developing individuals, this is not the case for the one-on-one, special education for individuals with ASD. Our findings revealed that 92% of the children with ASD are not continuing their special education during COVID-19 (13). Therefore, in addition to the telemental health opportunities it offers, technology enables individuals with ASD to continue their special education from home with applications created specifically for them using the ABA principles that are used in their special education centers.

In 2014, we designed an application that teaches children with ASD a skill that is part of the special education curriculum *via* tablets (16). The ABA-based hinting and scoring system we created was used as the basis for the autism education application Otsimo, which was selected as the best autism education application of 2019 by the University of Edinburgh. Otsimo now has a total of 339,989 users from 180 countries; of which, 208,176 use it for special education and the rest for speech therapy. Though this application initially targeted the ASD population, it is now being used by other developmental disability groups as well, serving as a technological platform to remotely address the educational and speech therapy needs of those with speech delay, developmental delay, ADHD, apraxia, premature birth, cerebral palsy, and Down syndrome. More recently, we created an ABA-based language teaching application for individuals with ASD using dynamic difficulty adjustment principles, which increased the engagement of children by adapting the content to their skill levels and the time spent with educational materials at home for these families<sup>1</sup>. Therefore, technology can also be used to bring special education to the homes of families with ASD (17).

## CONCLUSION

We believe that the recently recommended mental health technology revolution (1) should include components specifically designed for individuals with ASD who experience behavioral and social challenges even without the strains of the COVID-19 period. Therefore, we recommend that the authors' suggestion

<sup>1</sup>Shohieb S, Doenyas C, Elhady AM. Dynamic difficulty adjustment technique-based mobile vocabulary learning game for children with autism spectrum disorder. (Under review).

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of promptly investing in high-quality and accessible online and mobile mental health technologies during this pandemic (1) should include applications for disaster protocol training and distance education specifically geared toward individuals with ASD to help make this taxing period more manageable for the affected individuals and their families. Additionally, previous evidence and reports about using technology for remote parent training, for interventions for children with ASD, and for counseling for families with individuals with ASD can guide authorities to adapt such services to the pandemic conditions. We suggest that this could be done by formulating effective telemental health options that overcome the challenges reported for these remote endeavors in the past, and take into account the difficulties disclosed by the parents of children with ASD and sources for which they communicate a need in order to better cope with the changes associated with lockdowns and other measures necessitated by the pandemic.

## AUTHOR CONTRIBUTIONS

CD conceived and designed the manuscript and completed the revisions. CD and SS wrote the manuscript together. SS created the figure. All authors read and approved the submitted version.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Lifestyle Interventions Improving Cannabinoid Tone During COVID-19 Lockdowns May Enhance Compliance With Preventive Regulations and Decrease Psychophysical Health Complications

## OPEN ACCESS

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Studies investigating the psychosomatic effects of social isolation in animals have shown that one of the physiologic system that gets disrupted by this environment-affective change is the Endocannabinoid System. As the levels of endocannabinoids change in limbic areas and prefrontal cortex during stressful times, so is the subject more prone to fearful and negative thoughts and aggressive behavior. The interplay of social isolation on the hypothalamic-pituitary-adrenal axis and cannabinoid tone triggers a vicious cycle which further impairs the natural body's homeostatic neuroendocrine levels and provokes a series of risk factors for developing health complications. In this paper, we explore the psychosomatic impact of prolonged quarantine in healthy individuals, and propose management and coping strategies that may improve endocannabinoid tone, such as integration of probiotics, cannabidiol, meditation, and physical exercise interventions with the aim of supporting interpersonal, individual, and professional adherence with COVID-19 emergency public measures whilst minimizing their psycho-physical impact.

**Keywords:** cannabinoid, stress, HPA, resilience, lockdown, CBD, COVID-19, meditation

## INTRODUCTION

### The Psycho-Social Impact of Social Restriction

The current emergency public measures applied to prevent COVID-19 spread have restricted fully or partially people in lockdown cities, with half of humanity directly affected by these changes. (1) Billions of lives have been significantly altered, and a global, multilevel, and demanding stress-coping-adjustment process is ongoing.

Historically, social isolation has been used extensively as a research model for psychosis, suicide, anxiety and depression: all conditions in which the endocannabinoid system is implicated through different pathways, including the modulation of hypothalamic-pituitary-adrenal axis (HPA) function (2–4). Social isolation has been directly linked to increased incidence of suicide (5) and is considered a crucial factor contributing to suicide in humans (6–8). It induces

abnormal forms of behavior including an increase in anxiety- and depressive-like activities—such as increase in immobility time, decrease in grooming activity (3), exacerbation of aggressive behavior, and impaired fear extinction (9–11)—effects which directly affect both glucocorticoid and endocannabinoid responses (12).

Although lockdowns are used for social distancing and not to “socially isolate” people, the psychopathologist Baek has introduced the concept of “socially withdrawn” to define those individuals who are isolated because of their extreme involvement in the cyber space and the lack of relationship in real life (13). One may reckon that “real life” and “cyber life” are separated by a fine line when all interpersonal and professional relationships are experienced remotely, as it is currently happening to billions of people worldwide.

Prolonged social distancing has inevitably decreased the physical expressions of affection and social bonding and altered the neuroendocrine balance of neuropeptides (e.g., oxytocin), endocannabinoids (e.g., anandamide), and corticosteroids (e.g., cortisol), key physiologic systems mutually involved not only in maintaining emotional wellbeing but also in the regulation of the immune response, making the implementation of homeostatic strategies targeting those neural pathways even more pivotal during a viral global pandemic (14).

## Lockdown: Endocannabinoid and HPA Tone Disruption

Although the endocannabinoid (eCB) system is expressed ubiquitously in the brain, the highest CB1 receptor density is distributed in key areas for the regulation of stress and emotions: prefrontal cortex (PFC), hippocampus, and amygdala (15).

Previous studies have shown that antagonism or genetic removal of CB1 induces anxiety (16, 17); on the other hand, stress, fear, and negative emotions—as many people are prone to experience since COVID-19 diffusion—may alter the expression of CB1R in the amygdala, nucleus accumbens (reward system), and PFC (18–20). As the PFC is linked to the negative modulation of aggression in animals (21, 22), social isolation may induce a PFC-specific neuronal loss, which is associated with increased levels of aggressive behavior (23).

Social isolation also impairs the hypothalamic eCB system, a brain area also involved in the onset and manifestation of aggressive and fear-related behavior in mammals (24). Studies have demonstrated that the changes in the eCB system may contribute to the display of the stress response, yielding HPA axis stimulation and increased anxiety behavior (25). Indeed, rats that are housed as isolates show an alteration of the basal HPA axis activity and impairments in glucocorticoid-mediated negative feedback (26). These neuroendocrine unbalances are paralleled in human social isolation, with studies showing that cortisol levels are higher in chronically isolated individuals (27–29).

## PSYCHOPATHOLOGY OF eCB UNBALANCE

The endocannabinoids anandamide (AEA) and 2-arachidonoylglycerol (2-AG) are partial and full agonists at CB1 and CB2 receptors, respectively (30); increasing their levels *via* deletion or pharmacological inhibition of their metabolic enzyme fatty acid amide hydrolase (FAAH) was shown to reduce anxiety-like behavior (31, 32). An innate decreased anxiety-like conduct and better stress-coping behavior is associated, both in animals and in humans, with a common polymorphism in the FAAH gene and enhanced fronto-amygdala connectivity (33). Conversely, eCB levels are altered following several stressors. AEA is usually decreased, whereas 2-AG is most often increased under stressful conditions (25, 32, 34, 35). Chronic stress engenders a reduction of AEA concentration in the amygdala–hippocampal–cortico-striatal circuit, a feature commonly found in depression and posttraumatic stress disorder (PTSD) (2, 36). In these conditions, low AEA levels are associated with low cortisol levels and an upregulation of CB1 in the brain, effects which seem to be more pronounced in females than in males (37, 38). Gender differences on eCBs support the knowledge that women have a higher risk for anxiety, depression, and PTSD than men (39, 40). In addition, as reports have been showing consistently, during global health crises like COVID-19, women have been reporting higher rates of anxiety and depression than men, which relate with external stressors prevalently targeting women (increase of workload in the healthcare sector, increase of domestic burden, impoverishment, and increase in domestic violence) (41–45).

In short, endogenous cannabinoid signaling is essential for stress adaptation, while chronic stress (e.g., repeated restraint) reduces AEA levels throughout the corticolimbic stress circuit (31, 32).

These data were confirmed by studies examining the effects of social isolation on genes linked with eCB signaling, showing that this stressful condition alters several brain regions implicated in the pathophysiology of schizophrenia and PTSD, both in animals and in humans. CB1 is involved in stress regulation and result altered in several psychiatric disorders—such as anxiety, depression, bipolar disorder, PTSD, schizophrenia, attention deficit hyperactivity disorder, and eating disorders (46, 47). While prefrontal CB2 decreases after repeated stress both in males and in females, social isolation may induce upregulation of CB1R mRNA transcripts in cortical regions and downregulation in the amygdala in a gender-specific pattern due to the interaction between eCBs and sex steroids (48, 49). Females (both adolescent and adults) show higher baseline of CB1 and CB2 mRNA expression levels than males do, which is consistent among animal and human studies, as well as heightened eCB tone disruption to both acute and chronic models of stress (50–52).

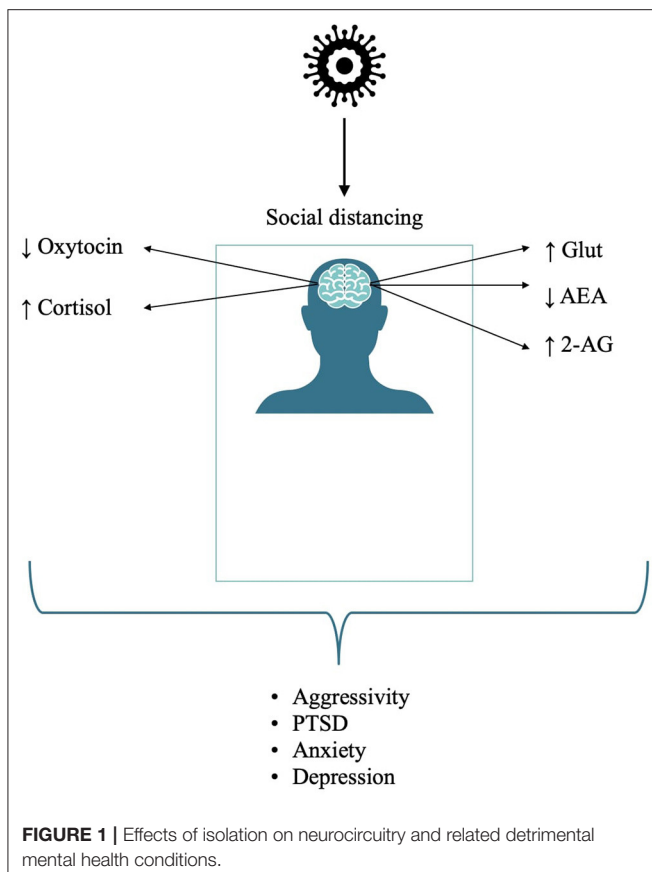
Changes also occur in the regulation of eCB mRNA expression in amygdaloid regions, especially AEA, a fact associated with increased anxiety in rats reared in isolation (48, 53, 54). The COVID-19 pandemic has led to a worldwide stressful time with a dual impact: lockdown and fear of disease and death; thus, resilience and appropriate coping strategies become factors

of crucial importance to reduce its impact and prevent stress switching into chronic ailments. Neurobiological observations have identified increased firing at the basolateral amygdala (BLA) and prelimbic PFC (plPFC) circuit as one of the key events in the “switch” from distress to psychiatric disorders (55). Recent findings have shown that the neuronal hyper-firing occurring in the BLA-plPFC circuit is due to the stress-induced downregulation of the eCB tone in this region; this induces an increased glutamate release, which, in turn, switches stress exposure into anxious behavior and burn-down (56).

Taken together, these data suggest the need for strategies aimed at not only decreasing stress *per se* but also helping to restore the eCB homeostasis, which is tightly bound to individual reactions in stressful environments and events (56). See **Figure 1** for a summary on the effects of isolation on neurocircuitry and related mental health conditions.

## Nutraceutical Interventions

It was shown that the microbiota is tightly connected to emotional behaviors and stress-induced changes (57) and that a perturbation in the microbiota causes functional changes in the eCB tone and behavioral alterations that correlate with depressive states. Therefore, the administration of probiotics may potentially help improve both depressive-like behaviors as well as stimulate the eCB tone, increasing AEA levels (58).



Another approved dietary supplement, N-palmitoylethanolamide (PEA), a fatty acid amide belonging to the eCB system (found increased under stressful conditions), has also shown promising potential antidepressant properties alone or in combination with other classes of antidepressants (59). Preclinical studies have shown its efficacy in depression and depression associated with neuropathic pain and traumatic brain injury models, which could serve the post-COVID symptoms (60). In a translational perspective, a randomized, double-blind study in depressed patients indicated a fast-antidepressant action of PEA when associated with citalopram (59). Several foods may also help modify gut microbial metabolism and glucocorticoid productions (61). One study demonstrated that a daily consumption of 40 g of dark chocolate during a 2-week period was sufficient to reduce the stress hormone cortisol and stress-related impairments (62). Moreover, it was shown that *Theobroma cacao* contains N-acylethanolamines (N-linoleoylethanolamide and N-oleoylethanolamide) which act as FAAH inhibitors (63–65).

Other food compounds that boost the eCB tone are found in black pepper, both *via* CB2 direct agonism by one of its sesquiterpenoids, b-caryophyllene, and *via* AEA uptake inhibition by the pepper’s alkaloid guineensine (66, 67). B-Caryophyllene is commonly found in spices and hence called “dietary cannabinoid” and was recently shown to also elicit antidepressant-like activity in isolated and stressed animals *via* CB2 interaction (68, 69).

Remaining in the “dark colored” food palette, *Tuber melanosporum* (black truffles) contain biosynthetic enzymes for AEA; the eCB concentration increases up to levels that have been found sufficient to activate CB1 and CB2 as the truffles’ pigmentation augments (70).

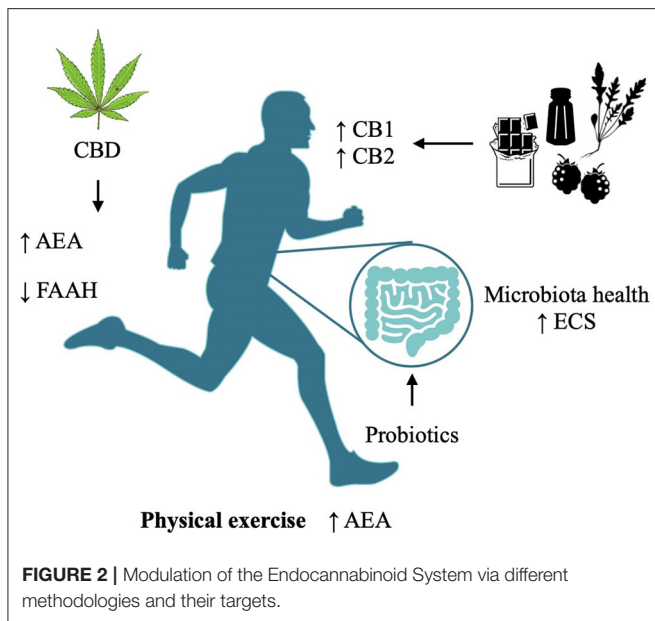
Fruit and vegetable containing the flavonoid kaempferol are also recommended to balance the eCB tone as it is possible that a high dietary intake of this substance could boost serum AEA levels *via* FAAH inhibition (71). Kaempferol is commonly found in capers, *Kaempferia galanga*, saffron, arugula, blackberries, and many other edible plants (72).

Finally, although it is still debated in literature whether a dietary intake would be sufficient to produce CBR-mediated effects, curcumin, the main constituent of turmeric, was nonetheless found to decrease immobility in animal depression models (73, 74).

## Phytoceutic Interventions

During lockdown in Canada and a few US States, cannabis was declared an essential service, allowing dispensaries to continue their activity and deliver cannabis products to customers (75). The authors agree that there is a rationale for the use of cannabis during these times. Studies have shown that the depressive-like behaviors induced by social distancing are mitigated by CB receptor activation (3). Moreover, isolation induces a reduction in PFC dendritic dopamine D2 receptors which can be rescued by CB1 stimulation (76). Where cannabis was more available, an increase of its use during lockdown measures was reported, perhaps highlighting an intuitive understanding by consumers for the need to increase the eCB tone (77–81). The increased





cannabis use was self-administered, yet not associated with an increase in DSM-5-CCSM total, depression, anxiety, and sleep problem scores in these Countries (78). However, as we recommend strategies that may be applied to the population at large, we would encourage the use of compounds other than tetrahydrocannabinol (THC)-containing cannabis, hence devoid of intoxicating effects. As lockdown poses an increased risk for isolation-induced aggression, the use of cannabidiol (CBD), a cannabis compound with anxiolytic, antidepressant, and antipsychotic properties, could prove useful (82). CBD has been tested in isolated animals, confirming its beneficial effects in attenuating aggressive behavior through a mechanism associated with an increase in AEA levels (via FAAH inhibition) and activation of 5-HT<sub>1A</sub> and CB<sub>1</sub> receptors (83).

Another non-psychotropic plant, *Echinacea*, can interact with cannabinoid receptors, both directly *via* alkamide interaction at CB<sub>2</sub> and indirectly *via* AEA reuptake inhibition (84, 85). *Echinacea* preparations, often used as a home remedy for colds, have been showing to induce an anxiolytic effect in animal models (86).

## Physical Activity

Physical activity has shown to play an important role in maintaining mental health, decreasing anxiety and alleviating depressive symptoms, and has been hence already recommended as a regular practice during the pandemic to prevent metabolic and immunological dysfunctions (87–89). Interestingly, it also modulates the eCB system balance, a fact suggesting its relevance from both a neurobiological and psychosomatic perspective (90). Indeed, increased eCB concentrations were found following a simple jog, bike ride, hike, and other moderate intensity aerobic exercises, while the differences of FAAH hydrolytic activity in active and sedentary individuals result in different AEA plasma levels (91–94).

## Hypnosis and Meditation

Meditation and hypnosis, despite their seemingly different history and conceptualization, may be regarded as two faces of the same coin, sharing several historical, procedural, and neuropsychological aspects (95, 96) as well as their link to the placebo effect (97). Placebo effect involves both endogenous opioids and the eCB system (98). As a whole, the available data on neuropsychological aspects of hypnosis and meditation highlight the relevance of a holistic approach encompassing the inseparable mind–brain–body–environment unit. A wealth of data has shown how hypnosis and meditation may enhance metacognitive control and engender intentional changes of activation/deactivation of unconscious brain areas and circuits leading to outstanding results, one for all hypnotic analgesia (99–102). Both hypnosis and meditation may help develop awareness, mindfulness, and metacognition, restructuring the patient's problem, enhance one's control over mind and body, and manage functional and psychosomatic disorders (95, 103). Therefore, one must establish a bidirectional mind–brain relationship, where brain changes yield mind ones and vice versa. As a result, both pharmacological and nutraceutical interventions may improve brain functions and help decrease symptoms, while behavioral techniques directly modulate the same brain function through cognition, a top-down mind–brain rearrangement.

A broad range of neurological and psychiatric disorders as well as deficits in self-referential processing, such as depersonalization, seem to be related to an altered balance between the default mode network, the salience network, and the central executive network (104). Their complex interplay and connection with other circuits as a dynamic whole is able to update according to demands (105), while their alterations may engender psychiatric disorders. Likewise, traumatic experiences may lead to increased activity of amygdala paralleled by a decreased capacity of anterior cingulate cortex to inhibit it (106).

On a neuropsychological standpoint, both hypnosis and meditation strongly affect the default mode network, a circuit involved in self-referential processing, and the anterior cingulate cortex, which, as mentioned above, may play a central role in dissociative identity disorders and PTSD (107). In doing so, they can help modulate the interrelationship of the abovementioned networks, which are the neuropsychological components of several psychological and psychiatric disorders and favor resilience.

## CONCLUSIONS

When life adversities and distress are concerned, like those related to COVID-19, resilience plays a key role. Resilience is a complex construct endowed with profound philosophical implications extending to Eastern culture (103); initially coined in physics and engineering, later on it has extended to both biology and psychology. Resilience is the capacity to withstand adversities by keeping the homeostasis, by recovering the initial

balance following perturbation or achieve a new balance through allostasis.

At a physiological level, maintenance of homeostasis is the primary function of the eCB system. During stressful times, the eCB tone changes in limbic areas and prefrontal cortex, which makes subjects more prone to a fearful state, negative thoughts, and aggressive behavior.

On a psychological standpoint, resilience is the capacity to withstand or quickly recover from difficult conditions, such as those related to family and social relationships, financial stressors, and workplace and health problems; it is a dynamic process of both biological and psychological adaptation, including emotional and intellectual aspects and their management in the sociocultural and environmental interaction that allows a better adaptation and coping by cognitive improvement and self-transformation, features reflected in the brain through their interplay with neurotransmitter regulation. This is the rationale for presenting different lifestyle interventions and holistic approaches that integrate phytotherapy and nutraceutical agents together with behavioral techniques—like hypnosis and meditation—which are presented with the aim of spreading preventive awareness on maintaining a healthy eCB system, especially during stressful situations like COVID-19. See **Figure 2** for a summary of the interventions. A detailed analysis of each of the therapies is far beyond the limit of this article; instead, we discuss first the knowledge drawn from the neurocorrelates of psychological and psychiatric disorders, and then we outline a few essential aspects of their implication in relation to the

current state of emergency. We aim to support governments worldwide in using evidence-based suggestions and indications to manage the socioeconomic problems generated by poor mental health.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

## AUTHOR CONTRIBUTIONS

VB conceived and designed the study, and wrote the first draft of the manuscript. VB and EF wrote sections of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.

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# Covid-19 and Families With Parental Mental Illness: Crisis and Opportunity

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The COVID-19 emergency has affected us all, but not equally. Families where parents have mental illness (PMI) are potentially at increased risk, but little is known about how they or their support services managed under lockdown/restrictions. We harnessed our existing partnerships with adult and child mental health services in the Republic of Ireland (RoI) and Northern Ireland (NI) to investigate the qualitative experiences of service users and families in coping during the first COVID-19 lockdown (March–May 2020), and how services were supporting them. Semi-structured phone/online interviews were conducted with 22 clinicians/managers (12 from RoI; 10 from NI) who provided information from their caseloads (~155 families with PMI). Sixteen family members (10 from RoI, 6 from NI) were also interviewed. Data were analysed using standard thematic analysis. Sixty percent of families reported improved mental health, primarily due to respite from daily stresses and the “normalisation” of mental distress in the general population. Approximately 30%, typically with more severe/enduring mental illness, reported additional challenges, and mental distress including: unmanageable child behaviours; fear of relapse/hospitalisation; financial difficulties; absence of child care; and a lack of routines. Service provision varied considerably across regions. The experiences within this case study highlight unique opportunities to address the multiple stresses of pre-emergency daily living. We also highlight how mental health services and governments might become more “pandemic ready” to more effectively support vulnerable families, including addressing service overload issues, optimising the use of digital technologies, and providing in-person contact and social supports where required.

**Keywords:** children, COVID-19, family, mental health, mental illness, parents, pandemic, mental disorder

## INTRODUCTION

On the 11th March 2020, the World Health Organisation declared the novel coronavirus (COVID-19) a pandemic, with immediate, global impact on our daily lives (1). As infections escalated during the first wave of the virus, the impact of lockdown/public health restrictions on mental health in the general population was increasingly recognised, as well as the need to support parents and children (2, 3). A UK population-based survey conducted in April 2020 highlighted greater concerns about the psychosocial effects of the emergency (e.g., stress, anxiety) than the risk of infection (4). Other similar surveys in the UK, US, and China found that 62% (5), 56% (6), and 54% (7) of

respondents reported moderate to severe levels of pandemic-related emotional distress during this time, including anxiety, stress, increased substance misuse, sleep difficulties and emotional regulation difficulties. Key triggers included: disrupted social networks/isolation; pressurised home environments (e.g., from overcrowding, home working, and lack of childcare); income loss/insecurity; and fear of infection.

Despite international calls to investigate the impact of COVID-19 on vulnerable groups (2), far less research has examined the experiences of those with pre-existing mental illness, socially disadvantaged families, or the services that support them. During the first, and subsequent lockdowns, there was increased alcohol consumption in 27% of family households (8, 9), and EU states (including Ireland and the UK) experienced a 60% increase in domestic violence-related calls (10). Furthermore, child protection referrals decreased by 35–50% during the first lockdown (March to June 2020), suggesting that cases were not being identified due to the closure/restrictions in usual referral sources (e.g., schools, General Practitioners and allied health professionals) (11, 12).

A UK study conducted during the first lockdown showed that levels of anxiety, depression, loneliness, and thoughts of self-harm were higher among people with pre-existing mental illness than in the general population (13). However, it is not known how many survey respondents were parents with dependent children. Internationally, a “hidden population” of one in four children have a parent with mental illness (PMI) and Northern Ireland (NI) currently has the highest levels of maternal mental illness within the UK (14), experienced by 30% of children aged 0–16 years. Despite substantial evidence indicating the intergenerational transmission of mental illness (15), the complex needs of these children and families typically go un-recognised and untreated (16).

Currently, most mental health services do not recognise the parenting status of service users due to individualised approaches to assessment and treatment, segregation of adult and child, and adolescent mental health services (AMHS/CAMHS) and professional competencies around child welfare concerns (17). Therefore, family-focused mental health initiatives, such as COPMI<sup>1</sup> in Australia and the UK Think Family Initiative (including NI) (18), were established to promote public/service awareness of the need to identify and support these “hidden” families (19, 20). However, other countries, including the RoI, lack basic policy guidance on how to identify and support families with PMI (21, 22).

In 2017, the Health Services Executive in the RoI funded the “PRIMERA”<sup>2</sup> research programme (2017–2021) to help implement and evaluate family-focused practise for families with PMI (randomised controlled trial (RCT) involving 92

families [152 parents, 249 children]) in 15 sites across the RoI and involving adult, child, and primary care mental health services (23, 24). Eighty percent of the PRIMERA parent sample attend AMHS for various mental health disorders; 20% receive antidepressant medication or primary care psychological support (24). This research provided the impetus for this paper.

Given the sudden and dramatic changes related to COVID-19, we were keen to ascertain how services and families with PMI in two different jurisdictions (the RoI and NI) were responding to stringent emergency-related restrictions. The objectives of this article were to explore: (1) the experiences of service users and families with PMI during the first COVID-19 lockdown; and (2) the views/experiences of mental health service providers who were supporting these families.

## METHOD

### Participants

We utilised (and sought permission from) our existing adult and child mental health service partners from the PRIMERA research and the Think Family initiative in NI (TFNI) to investigate clinician experiences on how services were supporting families with PMI during the first COVID-19 lockdown (March to end of May 2020), and to explore with a sample of such families how they were coping during this time.

In the RoI, service-provider participants included 12 clinicians/managers, linked to 8 PRIMERA sites, and working across AMHS, CAMHS, and primary care outpatient mental health services. They provided information on how families with PMI on their caseloads (~70 families) were coping during the first lockdown and on their own experiences of supporting these families (45 of the families were also participants in the PRIMERA RCT). Clinicians were predominantly from the disciplines of social work and social care ( $n = 7$ ), with reports also from three psychologists, one clinical nurse, and one family therapist. Family participants included 10 parents (6 PMI, 4 partners of PMI) and were purposively selected from the PRIMERA RCT sample ( $n = 92$ ). All families (including the 70 reported upon by clinicians and the 10 who provided direct report) had a similar profile to our larger RCT sample in terms of age and gender (88% female, aged 26–50 years), mental health disorder, site/location and (mainly socially deprived) socioeconomic status. Within the PRIMERA RCT sample, anxiety and/or depression are the most common mental health challenges (64%), followed by bipolar disorder (18%), emotional regulation disorder (10%), psychosis (6%), and Post Traumatic Stress Disorder (PTSD; 2%). At baseline, on average, families reported clinically significant emotional, interpersonal and family distress.

In NI, 10 Assistant Directors/psychiatrists, representing the views of acute adult mental health services across NI, provided feedback to the TFNI Coordinator (MD) on clinician and service user experiences ( $n = 85$ ) during the first lockdown (Donaghy, personal communication 27.05.2020). Data on the prevalence and severity of mental illness presentations are not yet routinely collected in acute adult mental health services

**Abbreviations:** AMHS, adult mental health services; CAMHS, child and adolescent mental health services; COPMI, children of parents with mental illness; NI, Northern Ireland; PMI, parental mental illness; PRIMERA, Promoting Research and Innovation in Mental hEalth seRvices for fAmilies and children; RoI, Republic of Ireland; TFNI, Think Family initiative in Northern Ireland.

<sup>1</sup>COPMI - Children of Parents with Mental Illness.

<sup>2</sup>PRIMERA - Promoting Research and Innovation in Mental hEalth seRvices for fAmilies and children.

in NI (25). Assistant Directors/psychiatrists estimated that the most common diagnoses are anxiety and depression, substance misuse disorders, bipolar disorder, PTSD and psychoses, which is consistent with research on prevalence of psychopathology in NI (26). We do not have accurate age or gender data for this sample but it estimated that service users with PMI are mainly female and aged 25–55 years old. Family participants in NI ( $n = 6$ ) were service users from one health care Trust in NI, female ( $n = 5$ ), aged 30–50 years old. Their diagnoses included anxiety and depression ( $n = 4$ ), bipolar disorder ( $n = 1$ ) and emotional regulation disorder ( $n = 1$ ). Their experiences were seen as typical of service-user experiences in NI more generally (Donaghy, personal communication 27.05.2020).

## Data Collection and Analysis

Semi-structured one-to-one phone interviews—lasting 15–30 min—were conducted with families ( $n = 16$ ) in the RoI and NI to explore their perceptions of how the COVID-19 emergency had impacted parent and family mental health and well-being. Likewise, service providers ( $n = 22$ ) in the RoI and NI provided feedback (via phone, email, and online platforms) on how ~155 families with PMI on their caseloads, were coping during the lockdown, as well as on their own experience of supporting these families. Detailed notes were taken from interviewees and due to time constraints, were subjected to selected verbatim transcription. Data were analysed using Braun and Clarke's thematic analysis to identify key themes across both jurisdictions, involving the process of familiarisation, coding, and generating, reviewing and naming themes (27). This process was framed and contextualised using The Family Model (28) (Figure 1), which highlights the interconnections among parent, child and family mental health, service responses, cultural influences, and protective and stressor factors within a transgenerational approach to mental health recovery.

The study was approved by Maynooth University Social Research Ethics Committee.

## RESULTS

Sample quotes for identified themes can be seen in the Supplementary Table 1.

### Improved Family Mental Health or No Change During Lockdown

Unexpectedly, both clinicians and families indicated that most families (~60%) reported substantially improved mental health and family relationships during this first lockdown, despite having a mental health diagnosis.

#### Respite From Stresses of Daily Life and Time to Connect With Family

A key factor was the respite from the stresses of daily life. The slower pace of life, with less pressure to be up and out early in the morning for work, school, and childcare, as well as minimal service appointments and extracurricular activities,

meant that about 60% of parents and children felt more rested and relaxed during the lockdown, and according to clinician and family reports, experienced less stress, anxiety and depression. Several parents ( $n = 7$ ) indicated that they now had time to “*just be themselves.*” Other parents ( $n = 5$ ) recounted benefitting from more emotional and childcare support from partners due to home-based remote working. Ten parents also reported that they had more time to connect with their children (e.g., through cooking, walking, and gardening) and that this, combined with less school and exam pressures, had led, for the first time, to more open and honest communication from their children:

*“He has opened up so much about how he feels about us separating and that is definitely due to the time we’re spending together now.”*

*“I didn’t realise how much stress commuting was doing to us until it stopped.”*

Both clinicians ( $n = 13$ ) and parents ( $n = 6$ ) indicated that family conflicts were more easily resolved, and had led to subsequent feelings of parental empowerment. A number of clinicians noted ( $n = 9$ ) that positive experiences of lockdown were more common in two-parent families and with less severe PMI, although several service users with psychosis and bipolar disorder also reported improved mental health.

*“Taking away the daily pressures of school, exams and work means that families are able to connect better with each other. There are less triggers for conflict, and when there is conflict, they seem more able to reach a positive resolution. For some parents they have become more confident in themselves, more empowered. This seems to be good for everyone’s mental health.”* (Clinician, RoI).

### A Chance to Feel Normal

Confinement in lockdown and fears of infection meant that anxiety and other mental health concerns became normalised and, consequently, many parents ( $n = 10$ ) reported that they felt less alone and more “*normal*” in expressing anxiety “*as the whole world is in crisis.*” Several clinicians ( $n = 8$ ) indicated that many parents were now feeling less stigmatised and were more openly discussing their mental health issues. This, in turn, was seen as beneficial for their own coping and parent-child relationships. Several parents ( $n = 7$ ) also reported that they enjoyed the respite from attending multiple service appointments and felt less monitored and judged as a result.

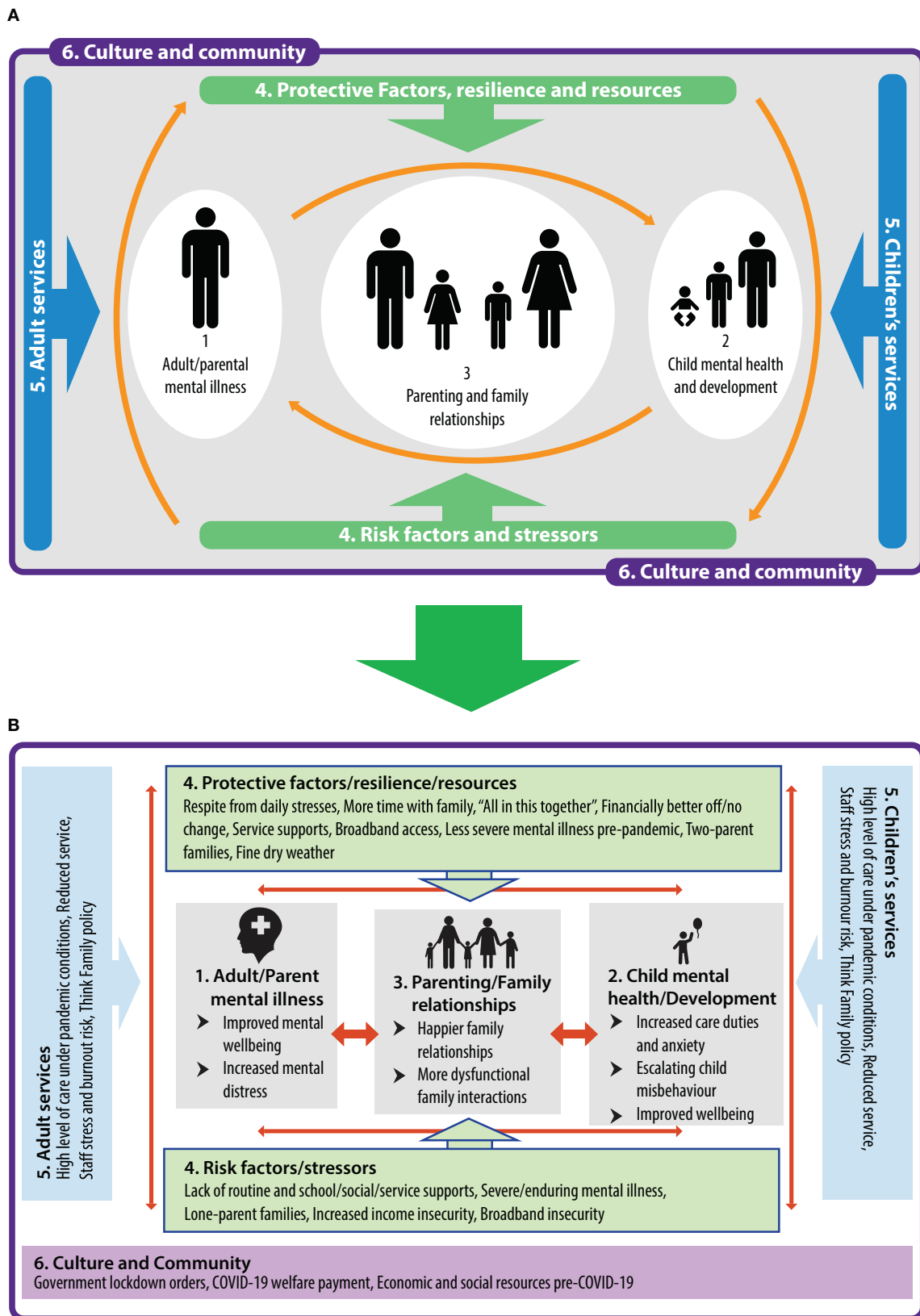
*“I’m surprised by how well I’m doing and even better than some people I know who don’t attend [mental health] services. I can just be myself, take time to look after myself... I feel less judged. The phone calls with my addiction counsellor are helping.”* (Parent).

*“The recognition that the crisis is having a psychological impact on the general population has given some parents permission to discuss their own mental health needs more openly, with Covid as the protagonist.”* (Clinician, RoI).

### No Change

A small number of parents ( $n = 2$ ) indicated that lockdown had not affected their mental health. Current family routines were largely similar to pre-emergency conditions in terms of one





**FIGURE 1 | (A)** The family model (16). **(B)** Qualitative themes contextualised within framework of the family model.

parent going to work whilst the service-user parent stayed at home with the children. However, the experience of lockdown may change over time. For instance, three parents reported that the initial stages were more difficult, but were coping better now. Conversely, others ( $n = 3$ ) were finding the restrictions increasingly challenging over time.

## Families Struggling During Lockdown Increased Family Distress Due to Worsening Parental Mental Illness

Clinician and family reports indicated that ~30% of families were experiencing substantial additional challenges due to lockdown restrictions, notably in cases involving more severe/enduring PMI. Mental distress was exacerbated in instances where a parent was at risk of relapse and hospitalisation. For example, a clinician reported that within one lone-parent family, extended family members would usually step in to provide childcare, but instead, the children were undertaking inappropriate levels of care/work to help prevent their mother's relapse. The mother expressed concerns about where her children could stay if she were hospitalised as well as the potentially increased risk of infection from hospital admission.

*"Families with one parent are finding this period very difficult especially if they feel they're relapsing. They have the added worry of who is going to look after the children."* (Clinician, NI).

More than half of clinicians ( $n = 12$ ) reported that lockdown increased anxiety and irritability for some parents, which they projected onto their children or partners. Correspondingly, two partners of service-user parents reported struggling with the increased tension and hostility in the home, lack of social outlets and reduced mental health service supports. A number of clinicians ( $n = 6$ ) and families ( $n = 4$ ) indicated increased alcohol use as a coping measure. Five clinicians observed that parents who have emotional regulation difficulties were particularly struggling. These parents missed their usual routines and having time away from their children, thereby leading to more strained relationships with their children and partners. In both the RoI and NI, clinicians ( $n = 8$ ) advised that there appeared to be a deterioration in client mental health as lockdown continued, with increased case complexity and a rise in referrals as time went on.

*"Where a parent has emotional dysregulation, they are struggling with not being able to get respite from children and home life."* (Clinician, RoI).

## Escalating Child Misbehaviour

Four parents reported that child externalising misbehaviour (e.g., disobedience, conflict) had escalated during lockdown which, in turn, contributed to parental mental distress. The lack of routine and socialising activities for children was very challenging for some parents in managing misbehaviour. Two parents indicated that the child welfare and protection service in the RoI (Tusla) was involved. One parent compared the home atmosphere to "a volcano" while another said: "We're literally breaking apart." Similarly, five clinicians described volatile home situations where Tusla involvement was required.

*"I didn't think it was going to be this hard. With the schools closed, I can't manage the [five] children. We're literally breaking apart...Tusla are involved."* (Parent).

## Protecting Others From Increased Stress

A number of parents ( $n = 3$ ) and clinicians ( $n = 9$ ) reported that the lack of childcare support, and expectations of working from home while home schooling, had exacerbated parental stress, but that parents were working with services to mitigate negative effects on their families. Five parents indicated they were experiencing financial difficulties and feared job losses. While parents were trying to protect their children from their financial (and other) worries, one clinician noted that children were also trying to manage their own mental health concerns so as not to overburden their parents. This is commonly seen in families with PMI, where communication of anxieties may be perceived as compounding family burden (29).

*"We are finding it very hard financially with me not allowed to work and schools closed. The kids are not doing too bad but we [parents] are struggling."* (Parent).

## Coercive Controlling Behaviour

There were also some examples of abusive relationships from clinician and family reports. For example, one parent with pre-existing depression indicated that her partner regularly flouted the physical distancing rules and left her alone while pregnant to look after their 7-month-old baby while he went drinking. She was in tele-contact with a psychologist to help her manage the coercive controlling dynamics of the relationship.

## Service Responses and Staff Well-Being

There was considerable variation across regions in NI and the RoI in terms of mental health service capacity to respond to families. Clinicians in some adult and primary care mental health services in both NI and the RoI were partially redeployed to frontline COVID-19 duties (e.g., covid testing), and several ( $n = 6$ ) reported high levels of stress and burnout risk due to a lack of childcare support, being redeployed and on call for frontline COVID-19 duties, and a belief that phone support alone was insufficient to meet the needs of many of their clients:

*"We are providing 'essential' services which is extremely important for public health safety due to COVID-19, but does feel inadequate from a mental health perspective."* (Clinician, RoI).

Four clinicians in the RoI questioned the strategy of redeploying short-staffed mental health teams to frontline swabbing duties. In other areas—both in NI and the RoI—crisis child protection services were reduced, and were not intervening in volatile situations where children were at risk of entering care.

*"Foster placements are breaking down with no crisis intervention, and young people are being transferred to residential care. Social workers are overwhelmed."* (Clinician, RoI).

Clinicians ( $n = 10$ ) in both jurisdictions also reported more positive experiences. One CAMHS area in the RoI, covering four counties, reported that phone support was well-received by families. Two AMHS areas (straddling three counties) provided high levels of tele-psychiatry support to families due to fewer new referrals than usual. Phone support reportedly

worked best in a context of pre-existing relationships with families, although most clinicians ( $n = 14$ ) believed that, in the longer term, face-to-face support would be required and that risk assessments were more difficult to conduct remotely. Commendably, within the two AMHS areas noted above, clinicians continued to undertake home visits and outpatient clinics for more vulnerable patients during the first lockdown, using COVID-19 guidelines. In addition, clinicians in these areas liaised with community organisations to help with service users' food and medication needs. While AMHS and CAMHS in NI were reportedly utilising online technologies during the emergency (Department of Health, 2020), very few of the PRIMERA AMHS and CAMHS sites were using virtual supports by June 2020. However, considerable progress has been made since then: during subsequent lockdowns, online and video platforms for individual and group interventions were commonly provided as part of service delivery in most PRIMERA sites, along with in-person support when required.

*“Telephone support has been received well by most service users. We have been able to provide more intensive telephone support as the rate of new referrals to adult mental health services has more than halved since the Covid restrictions. We have also been able to arrange home visits and out-patient clinics where required, using Covid guidelines.”* (Clinician, RoI).

## DISCUSSION

This paper provides an important snapshot in time of families with PMI during the first lockdown (March–May 2020) in two neighbouring jurisdictions. The observation that most families experienced improvements, or no change in their mental health, was unexpected, especially in view of the generally negative effect of COVID-19 on adult mental health in the general population (5).

For most (including some with severe/enduring mental illness), the lockdown provided a welcome respite from the stressors of “normal” daily life including school runs, service appointments, extracurricular activities and long commutes to work, all of which led to parents feeling more rested/relaxed, with considerable benefits for the entire family. Likewise, the results of a small study in one CAMHS area in the RoI, indicated that clients reported improved mental health during the first lockdown (30). Other research has also found that confinement benefitted those with schizophrenia and eating disorders (31–33), although others have reported adverse effects (34). Within the context of the current study, most of our feedback concerned families of lower socioeconomic status, and consequently, some furloughed workers (especially those in the RoI) were possibly benefitting from the COVID-19 unemployment payment; in addition, families more dependent on welfare benefits may be less affected by the immediate economic implications of the emergency (e.g., potential job loss). Further contextual factors, such as the unusually fine weather in Ireland and the UK during the first lockdown, also contributed to a “semi-holiday” experience for some families. Several families also reported feeling more “normal” due to a perception that mental distress was being experienced more widely in the population.

Disaster research suggests that crises may prompt responses of psychological resilience (35), and certainly a spirit of “battening down” to conquer the virus was evident among our family participants. However, it is less clear as to whether or not resilience efforts can be sustained indefinitely across a series of lockdowns. It is likely that many families in our study experienced a temporary “cocooning” effect from the “normal” hassles of daily life in the first lockdown and were not yet experiencing the probable longer-term negative economic and educational implications of the emergency. Life may become more stressful for families as countries emerge from lockdown and daily responsibilities return. Many commentators anticipate severe unemployment, especially with regard to low-income jobs less amenable to remote working (e.g., tourism, retail), and increased risk of mental illness and suicide, with services unable to meet expected demand (5, 36). More recent research supports this view, indicating a decline in referrals to mental health services during the first lockdown, but increased numbers and case complexity several months later (37, 38). In addition, the results of a survey of adult mental health service users in the RoI undertaken from May to August 2020, showed increased anxiety and isolation, and less engagement with services (39). Notably, the sample in the current study differed in that they were engaged with family-support services during lockdown due to their involvement in the PRIMERA research in the RoI and being part of the “Think Family” initiative in NI.

While the health, economic, and psychosocial impact of the COVID-19 emergency constitutes a major crisis, the positive experiences of many families during lockdown (all with pre-existing mental health challenges) nevertheless provide a unique opportunity to rethink how we can better structure our “normal” lives to minimise the stresses of early starts, long commutes, and work/family imbalances. Many sectors/governments (e.g., New Zealand) are considering the feasibility and benefits of remote digital working, 4-day weeks, and staggered commuting to reduce the risk of contracting and spreading COVID-19 (40, 41). Microsoft Japan have asked companies to join them in repeating their 2019 4-day-week experiment where they reported a 40% increase in productivity, with fewer sick days, happier, more motivated staff and a 23% reduction in electricity usage (42). Such measures could help mitigate COVID-19 infection, whilst also creating better work/family balance.

We were struck by the observation that service overload may contribute, at least in part, to family distress. Several families reported a sense of relief due to less surveillance (and implicit judgement) from services (although all were receiving some level of phone (and other) support by family-focused clinicians during the lockdown). Indeed, an ongoing NI case-file audit has found an average of 9.2 services (ranging from 1 to 23) working with these families (43). This suggests a need for services to avoid duplication and to consider more carefully the optimal number of appointments for families in a given week/month. However, while families enjoyed a temporary respite from attending services, a UK Department of Health (2019) report indicated that child health/development is likely to be significantly impaired without such supports in the longer term (44). In the RoI—and as confinement continued—service users reported increased

**TABLE 1** | Recommendations for mental health services in current pandemic and future non-pandemic contexts.

- Enable mental health services to become “pandemic ready”: that is, continue service provision during lockdowns and as we slowly emerge from them, use a blend of phone, online and in-person formats (using pandemic guidelines where appropriate)
- Develop/adapt/scale-up online interventions (e.g., psycho-educational videos) for use in both a pandemic and non-pandemic service context
- Incorporate more peer-based and community/voluntary sector provision of supports to provide for the medication needs of service users
- Minimise the redeployment of short-staffed mental health professionals to frontline pandemic duties. Instead, recruit dedicated testing/swabbing teams, as happened in Ireland 6 months into the COVID-19 pandemic
- Recognise the drawbacks of service overload and duplication
- Implement a “think family” approach to mental health service provision

anxiety and isolation due to less face-to-face engagement with mental health services (39).

Notwithstanding the mental health benefits of lockdown for many families in the current study, a substantial proportion of families, typically with more severe/enduring mental illness or emotional regulation difficulties, experienced additional challenges and mental distress due to confinement/isolation, lack of routines, anxiety, substance misuse, and child externalising issues. This is similar to reports highlighting an increased risk of additional mental distress and financial difficulties for the more socially disadvantaged, as well as increased alcohol misuse and domestic violence during lockdown (5, 10). Furthermore, we found substantial variation in the support provided to families across service areas, including management decisions on allowing safe in-person contact and redeploying clinicians to frontline COVID-19 duties, which had implications both for family mental health and staff well-being (45). As countries around the world begin vaccination programmes on an unprecedented scale, it is nevertheless likely that future pandemics will occur (46) and, in this context, lessons can be learned from those service areas that were able to more effectively support vulnerable families during the COVID-19 pandemic.

We also note that it took far longer for mental health services to implement remote digital technologies during the first lockdown when compared to the education and business sectors (this happened, in part, due to the redeployment of mental health clinicians to frontline COVID-19 duties). While there was commendable outreach by phone, the opportunities provided by digital technologies were not exploited in either NI or the RoI at the time. Encouragingly, considerable progress has been made in mental health remote provision during subsequent lockdowns, and research indicates that online mental health supports can be effective, particularly when blended with face-to-face contact, although not all clients may be able to access these due to unreliable broadband connectivity or a lack of confidence in using virtual platforms (47). A range of high quality online resources exist that could be more widely disseminated/promoted to clinicians and families with PMI, including COPMI and the Emerging

Minds websites<sup>3</sup>, although more evidence on their effectiveness is required. Recommendations for optimal online delivery include: addressing issues of client engagement, identifying core components of evidence-based interventions when adapting to virtual delivery, and monitoring outcomes and effectiveness (47).

This study was limited by time/resource constraints which meant that we were unable to directly interview more family members, conduct full verbatim transcription, and administer a mental health questionnaire to enable comparison with population mental health during the first lockdown. Nevertheless, this study has important implications for policy and practise in eliciting important insights into how a key underserved population—families with parental mental illness—coped during COVID-19 restrictions, as well as highlighting the experiences of service providers in supporting these families. The findings also provide some useful pointers as to how services and governments might more effectively support vulnerable families in both the context of the current pandemic but also as we emerge from it, and into the future (see **Table 1**). Lastly, the experiences outlined here suggest that we have a unique opportunity to re-imagine how we structure our daily work and family lives to improve work-life balance in a post-pandemic world.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Maynooth University Social Research Ethics Committee. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

SMcGi conceived of the original idea (and is also Principal Investigator of the PRIMERA research programme). MF and SMcGi led in drafting the manuscript. CM, AG, GD, MK, and MD contributed to manuscript revision and important intellectual content. CM led in collating, reviewing and synthesising the literature. MK, MD, MF, and CM co-ordinated service responses. SMcGa and MD liaised with service users.

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<sup>3</sup><https://emergingminds.com.au/>



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## SUPPLEMENTARY MATERIAL

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# The Interactive Management of the SARS-CoV-2 Virus: The Social Cohesion Index, a Methodological-Operational Proposal

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This contribution places itself within the emergency context of the COVID-19 spread. Until medical research identifies a cure acting at an organic level, it is necessary to manage what the emergency generates among the members of the Community in interactive terms in a scientific and methodologically well-founded way. This is in order to promote, among the members of the Community, the pursuit of the common aim of reducing the spread of infection, with a view to community health as a whole. In addition, being at the level of interactions enables us to move towards a change of these interactions in response to the COVID-19 emergency, in order to manage what will happen in the future, in terms of changes in the interactive arrangements after the emergency itself. This becomes possible by shifting away from the use of deterministic-causal references to the use of the uncertainty of interaction as an epistemological foundation principle. Managing the interactive (and non-organic) fallout of the emergency in the Community is made possible by the formalisation of the interactive modalities (the Discursive Repertoires) offered by Dialogical Science. To place oneself within this scientific panorama enables interaction measurements: so, the interaction measurement indexes offers a range of generative possibilities of realities built by the speeches of the Community members. Moreover, the Social Cohesion measurement index, in the area of Dialogical Science, makes available to public policies the shared measure of how and by how much the Community is moving towards the common purpose of reducing the contagion spread, rather than moving towards other personal and not shared goals (for instance, having a walk in spite of the lockdown). In this index, the interaction between the Discursive Repertoires and the “cohesion weight” associated with them offers a Cohesion output: the data allow to manage operationally what happens in the Community in a shared way and in anticipation, without leaving the interactions between its members to chance. In this way, they can be directed towards the common purpose through appropriate interventions relevant to the interactive set-up described in the data. The Cohesion measure makes it possible to operate effectively and efficiently, thanks to the possibility of monitoring the progress of the interventions implemented and evaluating

their effectiveness. In addition, the use of predictive Machine Learning models, applied to interactive cohesion data, allows for immediate and efficient availability of the measure itself, optimising time and resources.

**Keywords:** interaction, COVID-19, dialogical science, social cohesion, community, emergency, public health

## INTRODUCTION

The span between the end of 2019 and the beginning of 2020 saw the global diffusion of the infection caused by the new SARS-CoV-2 virus (Coronaviridae Study Group of the International Committee on Taxonomy of Viruses, 2020). It is characterised by its high diffusion, speed, and easy mutation. This last aspect makes it difficult to know the mutation pattern of the virus' RNA in order to identify an effective therapy system. It is not possible to explain how the virus changes (Giovannetti et al., 2020), what its incubation span is, the duration of the infectious period (Anderson et al., 2020), or the difference of symptoms between infective people (Chen et al., 2020; Lu et al., 2020). While waiting for medical research to identify effective ways to treat and prevent COVID-19 at an organic level, the spread of the virus becomes an opportunity to make a scientific analysis of what is generated interactively in the human community, the *Communitas*, in terms of public health.

*Communitas* is in fact defined as the mass of interactions in continuous change, triggered by members of the human species who inhabit and live in a certain dimension (geographical-territorial and/or virtual), towards the incessant search for a common and shared goal (Turchi and Cigolini, 2017). Currently, a shared aim involving the world population, the *Communitas*, is reducing the contagion spread of COVID-19. Such an aim, then, involves and requires accountability to each species member, enhancing the social cohesion of the whole community.

How can the scientific world contribute to the management of human interactions in an emergency situation, such as the current pandemic, in pursuit of the common purpose of public health, in terms of Social Cohesion?

The necessity, in scientific terms, lies in the need to promote a shift from the use of deterministic-causal criteria to the methodologically valid management of the uncertainty of interaction: this makes it possible to pursue the common goal, which currently concerns the whole human species, in parallel with research and action at the medical and organic level, and also to consider and manage changes in the interactions themselves in the future, when the medical emergency will be over. This contribution therefore proposes a fundamental shift from what science currently makes available to the Community to manage interactions in an epistemologically and methodologically well-founded way. From the common perspective of reducing contagion, interaction is the cognitive process at the basis of the scientific panorama (and not only of the exchange or communication act): *interaction*<sup>1</sup> is the perpetual process in

which two or more elements, in uncertainty, generate more or less stable interactive arrangements, which in turn are subject to changes (Turchi and Gherardini, 2014a).

Such interaction setups, constantly changing, always tend towards, at different degrees, the Social Cohesion of the Community. This, within the theoretical and epistemological framework we are outlining, is defined as the “whole of the modalities, at discourse level, configuring realities that concur to the shared management among the Community members of the key aspects anticipated, thanks to common goals.” (Turchi and Cigolini, 2017). The above definition, in terms of analysis of the Community members' interactions, allows for the availability of interactions measurement tools, including the Social Cohesion Measurement Index. The latter offers scientific data to calibrate the construction of the COVID-19 emergency management modalities on the interactions of the Community itself. The Social Cohesion Index, specifically, permits to obtain a measure of it in terms of the modalities with which the population narrates the current medical emergency situation, allowing researchers to consider the extent to which narratives on Covid-19 are oriented to the protection of citizens' own interests, rather than the promotion of public health. Such an index offers then a scientific datum that can be used to gauge the COVID-19 emergency management modalities construction based on interventions on the Community interactions. Therefore, in the absence of data describing what is happening at an interactive level, the strategies employed to manage the medical emergency risk are random, and to be subject to the personal opinion of the ones fielding them. This bears the risk that the key aspects, found within the interaction configurations, are not managed, and in turn contribute to the fragmentation between the members of the Community, leading to a lesser cohesion for the pursuit of the common goal. Having the discursive data of Social Cohesion available allows, therefore, to enhance the contribution of each citizen, using it for the sake of “Public Health.” Thus, the interactive contribution of the *communitas* citizens allows the promotion of community cohesion and the accountability towards a common goal. To this purpose, there are many scholars who have set out and defined the accountability phenomenon, such as Zuliani (2006), who sets out eight stages people undergo due to a natural disaster. One of these is the so-called “honeymoon stage” and another one is the “hero stage” where citizens help each other in a team and there is a climate of optimism.

In order to deepen the idea of “contagion reduction aim,” it is necessary, first, to distinguish between what concerns the organic

<sup>1</sup>“Diachronic process of different typology (energetic, metabolic, dialogic) by means of which, starting from two or more elements generated by the same process (previously or at the same time), assets/configurations, in which the elements can

or cannot be more distinguishable, are generated” Turchi and Gherardini, 2014a, p.141.



medical dimension of the individual and what concerns the interactive dimension of the Community in fundamental terms.

In the course of the historical and philological contingencies, the use value of “Health” has been exhausted within medical care, so that Health has assumed the meaning of “condition of well-being” on an organic level, and medical care has been understood as the integrity of the functional anatomical unit, i.e., the body (Turchi and Vendramini, 2016). In this way, Health is reduced, on a methodological and operational level, to the intervention on the element that determines the pathological condition of the individual, losing sight of the interactive dimension of the community collective aspect of Health. The distinction between Soundness and Health is made in terms of epistemological, and not only semantic, foundation<sup>2</sup>: Sanity refers to the physical and biological integrity of the individual organism, while Health is based on interactions between the members of the Community. Therefore, a criticality is identified, in terms of repercussions on the management of interactions, in the superimposition of foundation and epistemological plans, distinct in the conception of Soundness and Health, which in the current emergency scenario is undermining the modalities of medical emergency management.

If the aim is to contain the spread of the virus and safeguard the capacity of the health care system to respond, as a common good, research on the virus in medical terms is one way of pursuing the purpose. This does not, however, subsume the strategies with which to manage the repercussions already in place on the interactive level (economic, psychological, cultural, social, etc.) that the emergency itself generates, also in terms of changing interactions between members of the Community after the medical emergency is over.

The epistemological distinction of the words thus enables action to be taken in foundational-methodological terms in the management of the impact at Community level towards the common purpose. In the face of praxis that are placed in an exquisitely sanitary dimension of care of the biological organism of the individual, the diffusion of COVID-19 shows how a series of strategies implemented by the population on the interactive level of the whole Community is developing (for example, the neighbour who makes himself available to shop for the condominium’s elders). As with the various medical emergencies that have emerged over the course of human history, the virus has forced the human species to modify its interactive modalities, in order to compensate for their decrease against the quarantine and social distancing measures: it is on the level of interaction (therefore not only on that of research at an organic level) that the human species can effectively pursue the common goal of reducing the spread of the virus. It is on this level that the COVID-19 emergency, as far as it can be managed on the organic-sanitary level, will generate changes in the way members of the Community interact: for example, the “fear of contagion” may cause some members to maintain the rule

of social distancing even after the emergency has returned. It may therefore change the value attributed to what before the emergency was considered certain and taken for granted: for example, being able to go on a trip, to see a loved one, to have an internet connection at home.

The current impact of the COVID-19 emergency in the community has highlighted how the interaction between the many elements that characterise events in human history reveals the uncertainty of their evolution. The interactive elements of the current world situation can therefore be placed within an uncertain panorama, of which the virus itself is a manifestation: this Principle of Uncertainty (Heisenberg, 1963, 2015) shows how it was not possible to predict the phenomenon of COVID-19 and the extent of its effects on Health, in terms of interactions.

By adopting uncertainty as a Principle, described as the non-possibility to predict future events because the very starting conditions are uncertain, the current situation configures itself as an emergency situation. The emergency in fact is “everything that is produced as a follow up to an event that can to some extent change the arrangement of a community, sticking to a purely descriptive plan of what happens” (Turchi et al., 2015).

Considering this Epistemological Principle as a scientific basis, the below describes how the configuration of the current pandemic presents fundamental and methodological criticalities to be considered and on which to intervene on a management level. This allows one to direct oneself towards the promotion of Community Cohesion on the whole, through referring to interaction measurement data that can support the spread reduction of SARS-CoV-2 virus.

## PROMOTING SOCIAL COHESION AS A COMMUNITY NEED

The scientific panorama wants to trace the knowledge of the virus (Santosh, 2020) through the continuous collection of epidemiological data, in order to identify a constant characteristic of the virus. In monitoring changes in the epidemic, through databases that provide an overview of the epidemic situation (Li et al., 2020), it emerges that the data collected on an epidemiological level are constantly changing, varying according to the study and the elements taken into consideration (Anderson et al., 2020). For example, the WHO considers that the main transmission pathway is through close contact with symptomatic people; however, it does not exclude that it can also happen with asymptomatic people, claiming their rarity on the basis of the frequency of collected data (Istituto Superiore di Sanità, 2020). These aspects make the criticality of fragmentation of the epidemiological data collected traceable, given the diversity and uncertainty of contextual and environmental characteristics that differ from country to country and from individual to individual.

The collected data, although uncertain, are used to make estimates and forecasts of the epidemic trend on which to base political and economic choices for the management of the fallout of the emergency, through the use of mathematical-statistical models taken as reference (Consiglio Nazionale delle Ricerche, 2020). From a clinical psychological point of view, the research panorama highlights a series of possible psychological

<sup>2</sup>Epistemology is defined as “the branch of general theory of knowledge that deals with problems such as the foundations, limits, nature, and conditions of validity of scientific knowledge; it is the study of the general criteria that allow us to distinguish scientific judgements from those of opinion typical of metaphysical and religious constructions, of ethical evaluations.” (Turchi and Della Torre, 2017).

disorders (depression, anxiety, stress, psychiatric syndromes, etc.; Asmundson and Taylor, 2020b; Brooks et al., 2020; Loveday, 2020), also labelled *ad hoc* (Coronaphobia; Asmundson and Taylor, 2020a), which it considers to be the direct consequence of quarantine and isolation measures. The same happens within social psychology, which offers data on bias, stigma, and racist processes towards the Chinese population and between individuals in the same community (Chung and Li, 2020; Wen et al., 2020). These statements are based on studies carried out through the use of statistical data (Wang et al., 2020) taken as reference in order to explain what the COVID-19 emergency causes among members of the Community. The same data, in this way, is looked at and used through lenses that are always different, so that they will always give different results, even if they are used in order to predict what will happen in the future. Once again, psychological research focuses on human behaviour as an element to be considered in order to determine the spread speed of the virus (British Psychological Society, 2020). Such behaviours, however, remain subject to the uncertainty of interaction, so it is not possible to predict whether the behaviour under study will be implemented, how, and what its impact on the spread of the pandemic will be. Recalling the Principle of uncertainty of interaction, which generates temporarily stable and subject to change settings, the criticality can be traced in the foundations of epidemic management choices based on deterministic predictions, built on continuously changing medical outcomes. In this way, the management modalities do not take into account the uncertainty given by the interaction of the contextual elements of the data base offered, predicting what will happen on an interactive level. Predicting what will happen in managing interactions decreases the social cohesion degree. The prediction alone defines with certainty what will happen after a series of events. Thus, it does not allow individuals to design alternative strategies to handle unexpected realities. Anticipating, instead, a range of possible interactive key aspects that could happen in the community, would allow to manage at the same time, in a cohesive way, the whole community. Social cohesion is the chance that every citizen contributes his/her role in the community, through anticipation (instead of prediction) of the possible key aspects and management strategies, aimed at the pursuit of a common goal. On the contrary, setting out a single future scenario, instead of outlining at different degrees the possible ones, allows to reify what was predicted instead of managing what can happen for a common goal.

For example, when the quarantine isolation of citizens and the closing of commercial and economic activities are decreed by law (Wilder-Smith and Freedman, 2020) it is not possible to predict (and therefore establish future certainty) that a part of the citizenship will lose its job or receive no income from its commercial activity. However, this may still happen. When such management is anticipated and carried out, in the light of each community member taking charge of the common goal pursued, other than the exclusive personal aim, the community cohesion degree rises, and the community will not get fragmented. This, in turn, increases the chances to find solutions and strategies previously not available. These are interactive realities that enable, by the previous example, to find other ways to

receive income from one's own business or finding another job; differently, such modalities would not allow safeguarding not related to the citizen. So, where the citizen loses his/her job and does not have any income, in the employment of the sole prediction of what will happen, and thus in the decrease of the interactions, he/she can configure himself/herself as a "desperate person, with no other chances to live with," contributing to the interactive use of such a label to the fragmentation of the community.

Thus, basing interactive management choices in terms of prediction leads to an array of interactive fallouts that fragment community cohesion, increasing the chance of a rise of conflict creation and more fallouts, of which we offer below some examples. Adherence to the regulations, for managing the spread of the virus (quarantine, isolation, closure of economic, cultural, and educational facilities, etc.; Maxwell et al., 2020), as well as to the directives for the use of protective devices (World Health Organization, 2007, 2020), interactively eludes the regulations requirements: law decrees are becoming every day more coercive or connoted by the "prohibition" mode rather than the descriptive one of possible actions linked to the virus reduction aim. The Community is therefore not made part of the management but is continuously considered to be the mere executor of the restrictions imposed. This contributes to the making of a fragmented community, creating conflicts. Specialised literature unveils that having a third, superordinate aim, in the event of dangers for the whole community (see natural emergencies or catastrophes) where everybody can give his/her contribution and participation, reduces conflict generation (Sherif et al., 1961). Thus, by taking responsibilities for the sake of each member, Community Health becomes the chosen strategy to promote the social cohesion aim (Bifulco and de Leonardis, 2005). The above-mentioned process enables, also in methodological terms, to overcome the aggregation of individual preferences (and thus of the personal aim), towards a more general look, oriented to the Community (Boltanski and Thevenot, 1991).

All this becomes possible if the pandemic "emergency" reality is not considered as an entity, detached from the observer, but as created by the interactions among the speakers that narrate and build the meaning (as for catastrophic reality, see Berger and Luckmann, 1969).

Orienting the Community towards a common purpose then becomes necessary, when the interaction between the members of the species cannot be completely "segregated," precisely because it is related to a plan of uncertainty and randomness, and not organic determinism. In fact, adherence to the prescriptions is promoted by relying on the moral values of the individual and her or his "motivation" (Anderson et al., 2020) through information campaigns, and not on the basis of a scientific, epistemologically founded method of interaction management. We therefore leave it to the individual to interpret the information he or she receives, thus opening up the possibility that, despite quarantine, the citizen may decide, for example, to have dinner with friends, without him or her contemplating the possible repercussions that this action will have on the national health-care system, and therefore on the Community as a whole. Since the citizen is

not adequately trained in the management of virus transmission, he or she relies on his or her own beliefs and opinions on the extent of the emergency, which are different from those of other members of the Community (see in this direction the propagation of fake news, the increase of controversy and contradictory interpretations of regulatory bans, comments offered to the social pages of institutional representatives, etc.). In this way, the fragmentation of the Community's interactive management modalities jeopardises the conservation of the species. Fragmentation focuses mainly on meeting the needs of the individual ("I need to get out and walk, I'm going for a walk") and not on the common need of its members ("I could create a voluntary service that would allow the families of COVID-19 infected people to stay in contact with them, however isolated they may be in a hospital ward"). In the face of these examples, the fragmentation of emergency management strategies, built *hic et nunc*, without scientifically basing the operational mode of scenarios that could be effective for the management of interactions, is critical. This may affect the possibility of the population moving in a cohesive manner, towards the pursuit of the objective of virus reduction, thus the very effectiveness of the interactive repercussions of the medical emergency management process. Consider, for example, the increase in infections following the issuing of the Italian Prime Minister's Decree amending even slightly the previous provisions: "use of suitable devices" and "it is possible to play sports near your home" is interpreted as "then I can go jogging as long as I wear a mask and cover my mouth and nose when I meet someone." Given the above definition of *Communitas*, the pursuit of this common objective will in fact be all the more effective the more interactions between the members of the Community will increase, in the construction of emergency management modalities, towards *Social Cohesion*. Doing so makes it possible to promote, among the members of the Community, competencies enabling them to take on the role of citizens capable of contributing to the pursuit of the common objective. Managing in a shared way, therefore, what happens in the face of the medical emergency, brings with it the need to identify the critical interactive aspects of the situation in which you find yourself. Citizens can thus be put in a position to act on the problems anticipated, in synergy with political and administrative institutions. In this sense, each one is a node within a network of interactions, therefore able to manage what happens, sharing the aim of reducing the spread of the virus. This can be observed, for example, in the part of the population that has mobilised to build alternative oxygen masks to those used until now in the medical sector, starting from the criticality found in the availability of oxygen masks in hospitals.

## THE DIALOGICAL SCIENCE

The Principle of Uncertainty of Interaction, and the construct of Social Cohesion, therefore become useful references for structuring and implementing ways of managing what happens interactively, in the period of medical emergency. It becomes necessary, at this point, to place oneself within a scientific panorama capable of building knowledge from interactions.

Just as it is not possible to perform a surgical operation without any anatomical knowledge, in the same way it is not possible to manage what a medical emergency generates at an interactive level, between the members of the Community, without any knowledge of the uncertainty of the interactions that configure the emergency reality, with repercussions in terms of its Health.

It has become necessary to move towards the explicit dimension of scientific sense (Wittgenstein, 1999; Turchi and Cellegghin, 2010; Turchi, 2002) which offers a common and well-founded basis, from which to build effective ways of emergency management, in interactive terms.

The proposal for interactive repercussions management described below is placed within a *conceptual realism*<sup>3</sup>, in which the interactive reality of *Communitas* does not exist in itself but is built in the act of knowing it. Referring to the uncertainty principle of interaction, it is not possible to know the state of reality, but rather the process of its generation (Turchi and Vendramini, 2016), which is thus linked to "how" it is configured, and not to "why" the cause for which it exists in itself.

Therefore, starting from the shift from mechanistic paradigms to interactionist paradigms (Khun, 1962; Salvini, 1998; Marhaba, 2002; Turchi et al., 2007; Salvini and Salvetti, 2011), in order to be able to base the choices of world emergency management on scientifically based data, the proposal of this paper takes shape in Dialogical Science<sup>®</sup> (Turchi, 2009; Turchi et al., 2012b; Turchi and Gherardini, 2014b; Turchi and Orrù, 2014; Turchi and Vendramini, 2016; Turchi and Cigolini, 2017; Turchi and Della Torre, 2017)<sup>4</sup>. This takes charge of the discursive or dialogical process of knowledge (Turchi, 2013): it is therefore placed within the incessant flow of a process, which every time it is shown takes shape through contents. Content is configured as, precisely, "what it contains," the product, which is or is not there, of a certain procedural dimension, always present (Turchi and Cellegghin, 2010). For example, government action to make masks available, free of charge, to residents of an Italian region, remains a content, a product, which is linked to a process of managing the emergency fallout in the Community. The process, in this case the management, does not stop, and takes shape in the specific contents, the actions that are implemented: in order to manage what happens in the Community at an interactive level, it is then also possible to make available a bonus for babysitter salaries, hospital construction, and fundraising for the healthcare system. This is due to the uncertainty of the product or content, so that the form the process may take varies continuously based on the interactions within the Community. The interactive-dialogical process therefore generates configurations of realities (Turchi, 2013) with variable

<sup>3</sup>"Concepts of realities on the basis of which the scientific community generates knowledge products" (Turchi, 2017).

<sup>4</sup>"Science that has as its object of knowledge the use of the symbolic units that compose ordinary language, which gives form to discursive configurations; [it is] that cognitive apparatus that formalises the dialogical process (or discursive process)" Turchi and Gherardini, 2014b, p. 215.

stability through the interaction between rules<sup>5</sup> of use of ordinary language.

Ordinary language<sup>6</sup> (Wittgenstein, 1964, 1976, 2009; Foucault, 1967; Gadamer, 2000) is the object of investigation of Dialogical Science, as a generator of reality configurations of all those who belong to *Communitas*. The discursive reality thus can be described in terms of process, starting from the rhetorical-argumentative links that describe it as such (Bruner, 1991). The conceptual shift occurs, therefore, in considering *Communitas* not as a set of individuals but as a set of discursive productions that interact to generate discursive reality arrangements for the management of the medical emergency. How can management choices, based on medical data, take charge, scientifically, of discursive reality configurations?

The Dialogical Science research program allows to generate knowledge about interactions thanks to the formalisation of the rules of use of ordinary language. A formal language is built (Turchi and Orrù, 2014) out of the ways in which ordinary language is used in interactions, thus describing the ostensible property<sup>7</sup> of language. The formalisation of the interactive-discursive rules allows to obtain scientific data of a discursive type: this is possible by establishing, a priori, the rule of use of ordinary language. The configuration of sense of reality that is generated, in the use of these rules, is already defined a priori, regardless of the use of the language itself. Changing the rule, therefore, changes the sense of reality that is generated, and therefore the data that is offered (Turchi and Celleghin, 2010). This is also what happens within mathematical algorithms: by changing the value of the symbolic units used, the product of the algorithm will be different from the previous one. In the formalisation of the ordinary language, the same change occurs in the sense of the configuration of reality, generated by the data offered by its measurement. These data are in fact organised in the 24 Discursive Repertories (R.D.)<sup>8</sup>, available in ordinary language to configure meaning reality. According to the studies conducted in this field (Figure 1 and Annex 1—Periodic and Semi-radial Table of Discursive Repertories—Glossary), there are 24 possible and available RD for the human species. From research conducted in literature it emerged, in fact, that against a discursive space available to interactive individuals<sup>9</sup> (that is each of the 24 RD characterised by specific process properties peculiar and distinctive), some RD aggregations of those (Mariotti Culla and Turchi, 2007) outline profiles and degrees of social cohesion. Therefore, against the 24 possible

discursive modalities, a cohesion interactive setup is created, whenever the observation of some of those is privileged against other ones (such as the Targeting, Description, Consideration, and Proposal). Vice versa, as for conflict setups<sup>10</sup>, experimental texts have evidenced some modalities among the 24 available, that emerge with less frequency compared to other ones.

The interactions among the R.D. generating discursive configurations are organised within the Periodic and Semi-radial Table of Discursive Repertories (Figure 1), according to their generative properties of sense reality. The Table represents the main guiding tool in the analysis of the properties with which the ordinary language shows itself, and the extent to which the Community is inclined to change, in the management of what the medical emergency generates, at an interactive level. How much, therefore, moves in terms of Social Cohesion, to manage in a shared way and in anticipation of what happens, in pursuit of the aim of reducing the spread of contagion. In particular, as evidenced by the graphical representation of the Semi-radial Table, some modalities defined as maintenance ones (red colour) have been isolated, allowing the creation and maintenance of conflict profiles. These include Certify reality, the Cause of action between the discursive items, Judgement, and Comment. Other modalities, defined as generative ones (in green) represent social cohesion configurations among the interactive individuals. Last, but not least, hybrid modalities have been described (in yellow), that by themselves do not create conflict configurations but when associated with the maintenance ones they speed them up, increasing the degree of conflict exercised by the interactive individuals.

## THE MEASURE: THE GENERATIVITY AND DIALOGICITY INDEXES

Starting from the rules of the formal language it uses, Dialogical Science offers the theoretical-methodological elements able to measure the discursive configuration in a precise kairos (instant, moment). This makes it possible to manage the uncertainty of the interactions that are generated in the Community, in the face of the medical emergency: in view of the measure, it becomes possible to intervene by orienting the interactions themselves towards Social Cohesion. The measurement is offered by assigning to each R.D. two units of measurement: the Dialogical Weight (PD) and the Dialogical Moment (MD). The first offers a measure of the Generativity Index<sup>11</sup> (Turchi and Orrù, 2014, p. 2), that is “the ability of the Repertory to generate different and multiple discursive configurations” (Turchi and

<sup>5</sup>“Intrinsic characteristic of uncertainty that in its manifestation finds its own structure that tends to stabilise and become distinguishable and denominable in a language (except then interact with the whole and become a further element that generates uncertainty)” (Turchi and Vendramini, 2016).

<sup>6</sup>Ordinary language is the whole of symbolic units and rules of application that govern its use, at the basis of the discursive process.

<sup>7</sup>“The property of language to assume a different value every time the symbolic unit is used” (Turchi, 2009).

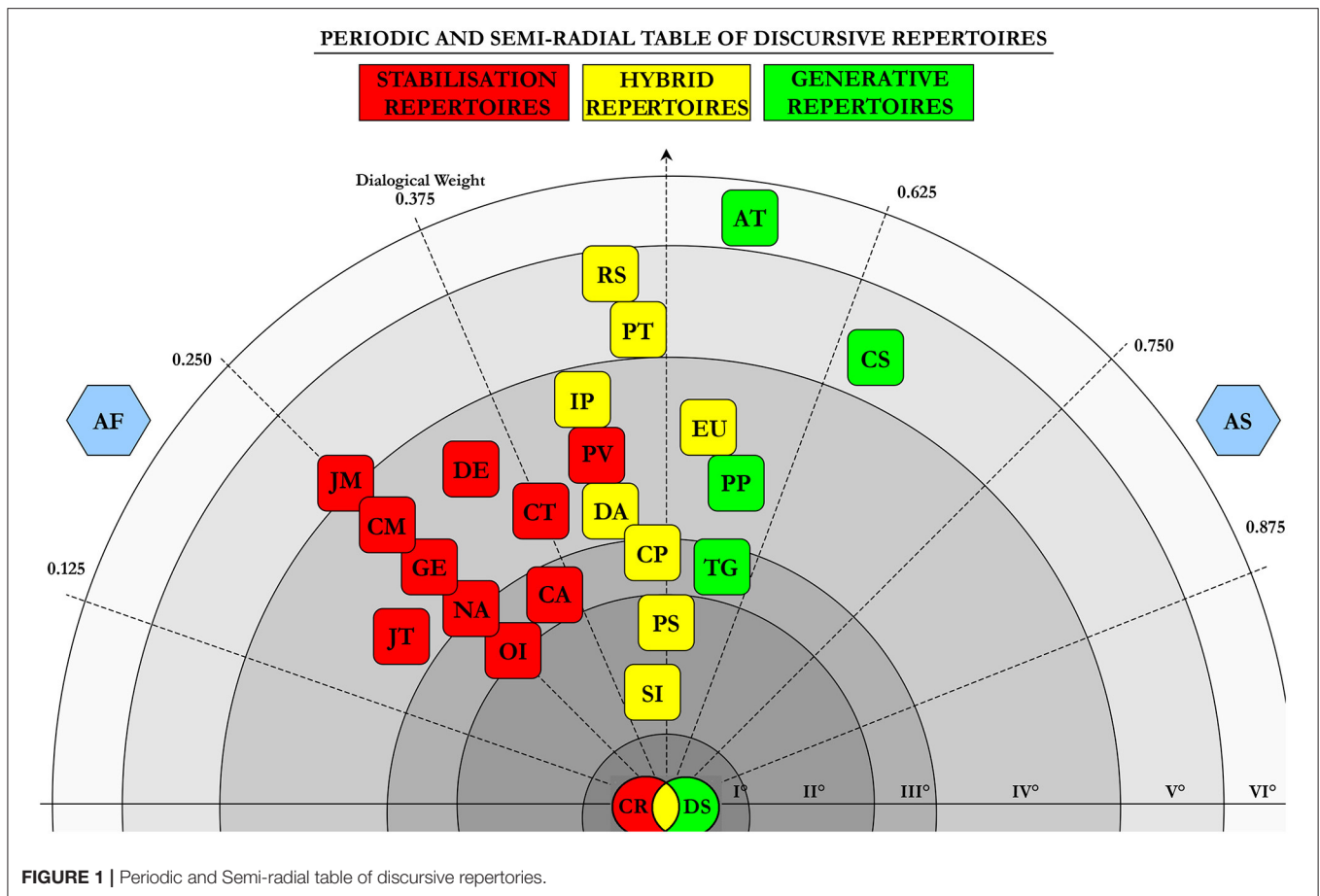
<sup>8</sup>“A finite mode of constructing reality, linguistically understood, with pragmatic value, which groups together even more enunciated (called “archipelagos of meaning”), articulated in concatenated sentences and diffused with a value of assertion of truth, aimed at generating (building)/maintaining a narrative coherence” Turchi and Della Torre, 2017, p. 91, Turchi and Orrù, 2014, p. 13.

<sup>9</sup>(Turchi and Orrù, 2014).

<sup>10</sup>By conflict it is meant the interactive setup of high fragmentation risk; here, the Veneto Region community members interact on the grounds of strongly personal aims and references, therefore with a very low/void orientation towards common and third goals. Since the personal aim interacts with the personal stance of another Community member, one excludes the other and their co-existence is not contemplated.

<sup>11</sup>The formula that allows to calculate Generativity (G) has been constructed as  $G = \Delta p \Delta m D$ , in which  $\Delta p$  indicates the weight of the configuration;  $\Delta m$  indicates the moment in which the configuration is traced; and  $D$  indicates the constant, the quantum of Generativity, that is the discursive space that can be generated (in which  $D \geq \Delta p \Delta m$ ).





Cigolini, 2017), with a value between 0 and 1; the second offers a measure of the Dialogicality Index, that is the type of link that is created between the R.D., and the “strength” of this link in terms of narrative coherence<sup>12</sup> (Turchi and Cigolini, 2017). Both measurement indexes describe which discursive modalities interact, and in what way, in the generation of a certain reality configuration. The Generativity and Dialogicity measurement indexes can indeed be measured in anticipation (before the implementation of an intervention), in itinere (during the development of the intervention), and *post hoc* (after the intervention has been completed), presenting scientific data that can be used to pursue the intervention objective that is set in the most effective way.

Thanks to the availability of the measure of the interactions, generated by the *Communitas* members, it is therefore possible to intervene on them. Starting from the measurement indexes presented, it has been possible to build methodological praxis of the dialogical operational model, able to intervene on the

<sup>12</sup>“The intrinsic and organising property of the elements that constitute the discursive productions, to maintain congruence and uniformity in such a way that it is not possible to generate a contradiction in narrative terms, generating a configuration that, by common sense, is set as given and certain” (Turchi and Gherardini, 2014b).

interactive events of the Community (Turchi and Della Torre, 2017). Among them the anticipation (and not the certain prediction of a single possibility, as happens on the medical level) of a range of interactive scenarios is scientifically based (Turchi et al., 2013b). These could be described as critical in pursuing the shared aim of reducing the spread of the virus: for example, the possibility that elderly and lonely people may find it difficult to have access to what they need (shopping, medications, etc.), or that some members of the Community may not conform to the legislative requirements. *Anticipation*, a necessary step for the management of critical aspects from the perspective of Social Cohesion, is therefore a methodological practice on which to build emergency management methods, starting from the measurement of interactive data, and no longer only medical data, and the trajectory of narrative coherence traced by the speeches themselves. For example, it is possible to measure the citizen’s contribution to the Community when he says that he “feels extremely lonely because he is in need of hugging someone,” so he decides to go out despite the quarantine measure, or else, when he says that “although this situation makes me feel lonely and I am not used to it, it can be an opportunity to think about how to make people in quarantine feel less lonely.” Therefore, in the view of what has been measured, it is possible to anticipate the trajectories of interactive development of both

statements, and to calibrate the management strategies of the critical scenarios anticipated, before they actually occur, that can increase the degree of contribution to Public Health and therefore to *Communitas* Social Cohesion. Through the use of anticipation of a range of future possibilities, the members of the Community are in a position to consider more possibilities for the pursuit of the shared purpose. The measure therefore enables these possibilities to be considered in terms of scientific data on which to base management choices of possibilities themselves.

Methodologically, therefore, it becomes necessary to collect, observe, and analyse the text produced by the members of the Community: this makes it possible to measure the configuration of the reality under investigation, through the use of R.D. and measurement indexes. As already presented, on a theoretical point of view, in the previous section, experiments conducted with a control group who were asked to generate conflict setups against a verified actor, it emerged that when a party exercises the cited maintenance modalities, the other party uses in turn the same discursive maintenance modalities, but among all those privileged we find Justification and Certify reality. Also, when conflict setups are described, as those cited in the discursive productions, Evaluation, Description, Consideration, Opinion, and Proposal modalities decrease. That is, the conflict discursive configuration (maintenance, red) erodes the available social cohesion part (generative, green). So, the range of possible interaction setups spans between two polarities, conflict and social cohesion: the more modalities creating conflict are isolated, the fewer social cohesion discursive configurations can be created.

Therefore, each text, produced as regards the study object, and therefore, in this paper, concerning the medical emergency linked to the Covid-19 spread, contributes to the Community social cohesion level. The assumptions regarding how the virus spreads, the stances towards the legislative decrees issued, the moods linked, for instance, to worrying about oneself and the loved ones, and the behaviours and the precautions adopted to diminish the contagion risk, are all considered in the analysis. These all become specific items, with particular content, within the interactive-dialogic process of building reality configurations. All these, to a different extent and with varying force, concur to the generation of a particular community setup creation—more or less cohesively—for the pursue of the virus spread reduction aim. What has been produced by Dialogical Science in terms of measuring reality configurations has been implemented in several research and intervention projects, including a study completed in 2011 in the Italian territory of L'Aquila following the emergency generated by the natural catastrophe of the earthquake of April 6, 2009. The collection and analysis of the text, through study protocols with open questions to 2000 inhabitants of the territory affected by the earthquake, measured Health indicators of discursive interactions, and therefore of social cohesion, in terms of citizens' competence in the management of the emergency and participation in community life: they draw a description of how the participants configure their social and interactive reality in terms of Community Health in facing the “catastrophic event” (see Turchi et al.,

2015). The collected data showed a configuration oriented to the maintenance of the “catastrophe” reality, as it is, mainly linked more with the use of Repertories such as Certify reality, Opinion, and Judgement, and less to Repertories such as Description or Targeting.

Data allow then the implementation of public policies that place citizens in the perspective of shared management of the critical aspects generated in response to the catastrophe, thus directing them to the perspective of Social Cohesion. Another application took shape within a 2011 study (Università degli Studi di Padova, 2011) describing the process of discrimination (“stigma”) against people affected by HIV within the Italian territory, conducted on a survey group of 1,267 respondents (among people affected by the virus, family members, health and social workers, and citizens not affected by the virus), who were administered an open questions set protocol. The researchers, through a series of evaluation indicators and the availability of indicators to measure the degree of stigma against people with HIV, have obtained data on how the members of the Community, in their role, narrate the interactions related to the object of the survey. The subjects involved in the study employ maintenance discursive modalities, through narrations like “Every day is a struggle to survive” (Certify reality R), or “It will be hard to achieve a normal family condition” (Prediction R). In particular, the cognitive plan in which we have set ourselves has made it possible to measure the Generativity of the stigma towards people affected by HIV at a national level and the Dialogicity of the narrative coherence of the participants in relation to the construct of the survey. The fluctuation in the value of the process of discrimination therefore provides the starting point for managing stigma within the Community, intervening on the interactions and roles involved more or less directly with respect to the issue towards a shared management of this critical aspect, therefore in the perspective of Social Cohesion.

A final example of what has just been described is the InOltre Service, an essential level of assistance within the Veneto Region (Italy) also based on the assumptions of Dialogical Science. The service was born in 2012 with the aim of “promoting the Health of the territory through the management of the implications of the socio-economic asset” (Turchi and Cigolini, 2017; Turchi et al., 2019). The availability of a measure of the interactions and the reach of the objective described above make it possible to take charge of the repercussions of emergencies at an interactive level in anticipation: this is done in terms in which it allows flexible intervention, depending on the changes that are generated in the Community, directing users towards the pursuit of the common purpose in the management of critical aspects in a shared way. Thanks to the use of the anticipation practice, it has in fact been possible to extend the service, over time, from entrepreneurs in crisis or bankruptcy, to savers victims of the banking crisis, to citizens in critical biographical moments, to Italian citizens during the emergency COVID-19. Taking charge of the user base is made possible and effective by the availability of text measurement indexes on which to base anticipations of the users' narrations, regardless of the content they offer.

The text<sup>13</sup> productions of the service users, that approach the service due to reasons linked to the pandemic, during the phone calls that the service receives and records, could then employ discursive modalities mainly of the maintenance type as Prediction, Judgement, Cause of action, and Comment, offering narrations such as “I’ve tried everything, I try to fill my days with things to do to keep well during quarantine, but in any case I feel bored” (Certify reality R. + Contraposition R.). The use of Hybrid Repertoires, such as Possibility (“I could take advantage of the quarantine to get a new hobby”) could also be collected.

The measurement indexes obtained in the applications described above therefore make it possible to have available a datum related to whether or not the Community’s narratives are open to different discourses on the configuration of the reality under investigation (whether it is an “earthquake,” “banking crisis,” “HIV,” or “COVID-19” emergency). The datum makes it possible to describe the Community members’ discursive modalities and to evaluate the direction in which they are oriented. The more interactions increase and are directed towards the construction of alternative sense realities to those available, the greater is the possibility that the members of the Community manage critical aspects in a shared way towards the pursuit of the common goal. At public policies level, having available measurement indexes becomes useful to build medical emergency management interventions, specifically gauged against the discursive modalities fielded within the Community and the anticipation of the future community setups. Moreover, it serves to assess their effectiveness and efficiency, both in the short and long term, to increase social cohesion. That is, interventions that take into account, at each stage, the stance and the opinions of the Community members about the medical emergency, the behaviour, and the actions taken for its management (how such discursive modalities are oriented for the pursue of the virus spread reduction common goal in the most cohesive way).

In 35 years of activity, the Dialogical Science research program has conducted research and interventions in different fields, such as psychiatric (Turchi et al., 2016), sports (Turchi et al., 2008, 2010a), social (Turchi et al., 2012a; Iudici et al., 2018b), economic (Turchi et al., 2008), penitentiary (Turchi et al., 2013a), emergency (Turchi et al., 2015), health (Iudici et al., 2018a), community (Turchi and Romanelli, 2019), mediation (Turchi et al., 2010b), geriatric, and engineering, collecting, about 200,000 fragments of text. Now, thanks to its theoretical-methodological structure, the research program has also been able to be inserted within the medical emergency of COVID-19. Over the course of time, the research program has taken the opportunity to have the interactive measure of the reality narrated by the members of the Community available in an almost immediate way, thanks to Machine Learning technology (Turchi et al., 2020). By using Machine Learning technology, it is possible to increase the capacity of text analysis through the methodology used in Dialogical Science, thus being able to deal with Big Data on specific geographical or thematic areas/contexts/areas. The output data of the analysis carried out through Machine Learning

allow to obtain and manage different and uncertain discursive configurations in their manifestation, through a predictive model that identifies the Discursive Repertoires used in the text, so as to be able to measure the indexes and subject of the search, contemplating and calculating the margin of error of the measurement itself. This is made possible thanks to the use of Artificial Neural Networks (NNs), enhanced by the use of particular NNs, i.e., Recurrent Neural Networks, designed to accept vector sequences as input and produce, as output, and as integrations of the entire sequence submitted to them. This makes it possible to name the Discussion Repertoires in a digital way.

What has been described allows researchers to intervene on the emergency reality available from computerised data that do not stop at the logical-grammatical analysis of the text but offer an overview of how the language configures reality, optimising time and resources. In the critical interactive emergency situation of COVID-19, this enables the quick and efficient availability of the interactive scientific data needed to calculate the Social Cohesion Index. The above enables the political-management roles to set up and structure management modalities precisely gauged to the interactive “status” of the *Communitas* members, as for Public Health in the current medical emergency period (Heymann and Shindo, 2020). For instance, it is considered how the extended use of protective masks during the social distancing period has been perceived, against its effectiveness and the effects it has on people, or else, the various opinions, either expert-like or not, related to the present and future outcome of the pandemic on physical and mental health and on interpersonal relations. In this sense, to have this kind of data available, precisely gauged and quickly analysed, and therefore always up-to-date and pertinent, enables the management roles previously mentioned to monitor, assess the activities, and choose the initiatives and policies implemented in the territory tailored for the citizens, both at the time of measurement and with a future perspective, thus promoting social cohesion of the Community and reaching the highest effectiveness and efficiency levels.

## THE MEASURE: THE COHESION INDEX

Starting from the theoretical foundations and the formal language of interaction, Dialogical Science makes available the immediate processing of interactive data, on which to base management choices at the level of public policies: there is a measure of how *Communitas* citizens are using the interactive modalities available to them in relation to emergency management and how they are moving in pursuit of the aim of reducing the spread of the virus, whether or not this is in a cohesive manner. In this direction, the progress of the Dialogical Science research program has made the index measuring Social Cohesion available.

As we previously saw, the Community aim during the Covid-19 pandemic is the contagion spread reduction. Considering this context item, i.e., a text item, concurring to (is part of) the studied discursive configuration, we asked ourselves what is the use (the

<sup>13</sup>Collected in accordance with Italian privacy regulations.

value) of what the Community offers (in terms of discursive productions) for the defined object<sup>14</sup>. The study question for the measurement of the social cohesion level is then: what is the use value of the discursive configuration observed, against the common goal of the reduction of the contagion spread? The index shows how much the discursive configuration of the Community member is oriented towards the management of critical issues in the pursuit of the shared aim or, vice versa, how much it is moving away from it, thus moving towards the fragmentation of interactions, which can affect the pursuit of the common objective. In order to make the Cohesion construct measurable, the two dimensions in which it has been declined are the anticipation of future scenarios<sup>15</sup> (variable *x*) and shared management (variable *y*), the two variables that are constantly changing according to the objective to be pursued. The common goal is always present and may vary depending on the context.

Once again, the Discursive Repertories are configured as the elements able to offer a measure of Cohesion, in relation to the role they play towards the two variables defined above. It has therefore been defined which Repertories, and to what extent, are included within the definition of Social Cohesion, in its dimensions of shared objective, anticipation of critical aspects, and shared management of the same (see definition on page 1).

It is assumed that the use of some Repertories contributes to the pursuit of the common goal, the use of others less so. The Repertories, by interacting with each other, make a degree of cohesive contribution that varies according to their use in pursuit of the common goal of reducing the spread of the virus. If the discursive elements are aimed at pursuing different objectives than the one set, then the degree of cohesion is assumed to decrease. Conversely, these will increase it.

In order to offer a measure of how it contributes to Social Cohesion, each Repertory of the Table is associated with a value, the “Cohesion weight,” expressed in positive or negative terms. If expressed in negative terms (for example, the Repertory of Judgement, associated with the value  $-2$ ), it always contributes to a decrease in the degree of Cohesion (as in the following text: “Council members are by no means available and Police forces are sometimes not collaborative enough with citizens”). If expressed in positive terms (for example, the Repertory of Description, associated with the value  $+9$ ), it always contributes to an increase in the degree of Cohesion (as in the sample text “The neighbourhood population consists mainly of elderly people and students”). If the symbol associated with the value is  $\pm$ , the Repertory may or may not contribute to the degree of Cohesion depending on the orientation to the objective set (as in the text: “All this chaos in the city must be

cleared”—Certify reality’s Repertory, configuring a stagnant and unchangeable reality).

By associating the Discursive Repertories with the variables in which Social Cohesion is declined, they are considered in increasing order, according to the degree to which the properties of the R.D. themselves contribute or not to the variables, and therefore in a wider sense, to Cohesion. The Anticipation Repertory is one that increases Cohesion to the highest degree (“Considering how the number of infections is decreasing, the government may decide to relax the containment measures by making specific provisions with which each business can re-open”). The Proposal Repertory is one of those increasing the variable of shared management to the maximum degree (“Since we cannot spend Easter with our loved ones, we can have a party among us tenants and involve family members online”). In this way, due to the R.D. used in the analysed text and their Cohesion weight, the variables oscillate within a continuum from 0 to 10 (Figure 2) which accounts for how the Community is moving to reduce the spread of the virus (i.e., the degree of Social Cohesion), through the output data resulting from the application of the index itself. It is thus possible to describe whether the Community narratives are pursuing the objective of Cohesion in terms of shared Responsibility<sup>16</sup> or whether they are generating fragmentation, pursuing personal and implicit goals.

Getting to the core of this last-mentioned aspect: since Discursive Repertories’ Dialogic Weights give evidence of the capacity to create “other” discursive configurations, different from the one already available in the dialogic process, a discursive configuration with high Dialogic Weight (Turchi and Orrù, 2014) makes possible in the language use an interactive movement aiming at the pursue of the set aim. At the same time, considering also that each Discursive Repertory is linked to the other ones according to the Dialogicity Index, the Dialogic Moment, a low degree of discursive configuration Dialogic makes a low capacity of the Repertories to create relations, indicating that the dialogic process can only minimally change (see the Periodic Semi-radial Table); a high degree of Dialogicity, instead, evidences a discursive configuration where the Repertories come more into relation with each other, therefore they get together making more convertible (high ostensive value) the attribution of the use value of a reality status (including the one set as the defined aim).

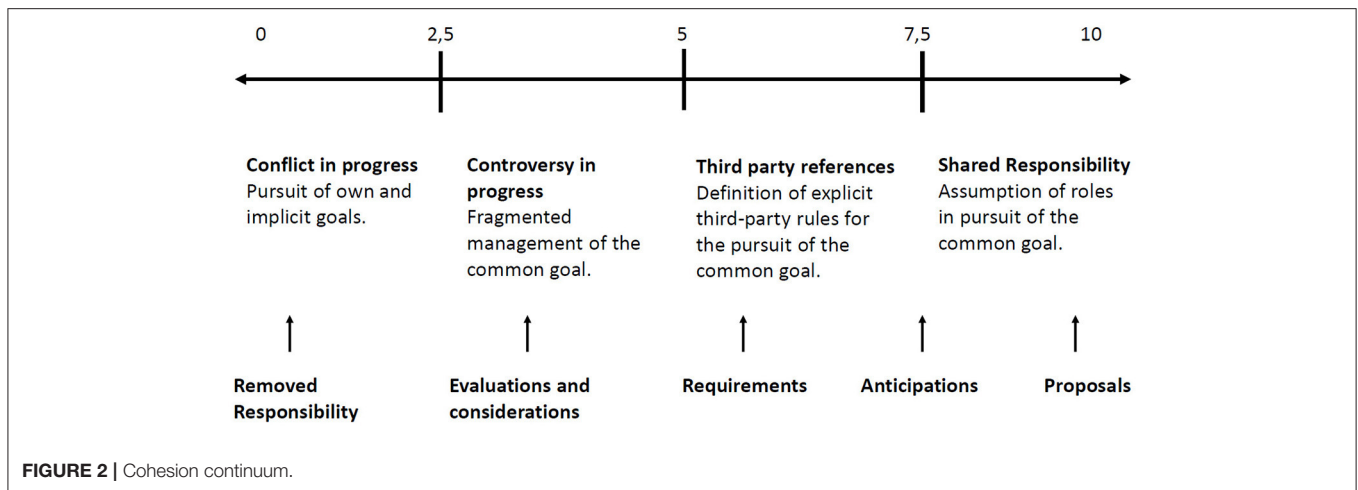
Hence, a high Weight and high Dialogic Moment is an indicator (in the uncertainty assumed as a Principle) of a high range of possibilities to generate reality sense with a high ostensive value; this brings a high uncertainty degree of the dialogic process trend, even against the adherence chances to the Targeting. A low Dialogic Weight and low Dialogic Moment configuration indicates, instead, that there are not many chances to generate reality sense (and therefore of adherence to the Targeting); such chances produce configurations that depict a reality sense, at high maintenance and exclusive level. We can

<sup>14</sup>The defined goal/objective, as part of the discursive space, can modify and change content; however, the adoption of the Targeting Repertory as an observer does not change.

<sup>15</sup>In the absence of empirical-factual causal links, it is not possible to “predict” what will happen, but one can rely on the narrative coherence of a discursive process in order to anticipate which configurations of reality could be generated compared to the available one (Turchi and Della Torre, 2017). The anticipation of future scenarios allows the members of a community to build shared management choices to go in the direction of the common goal.

<sup>16</sup>“Configuration of the interactive asset of the Community in which each member, or aggregation of members of the same, can build its own dialogic node in the interactive asset and thus contribute to its development, towards the generation of Social Cohesion for the entire Community of belonging” (Turchi and Gherardini, 2014b).





state, then, that the highest degree of adherence of a discursive configuration to the Targeting Repertory<sup>17</sup> is obtained from the wider (configuration possibilities) range that can be produced by employing ordinary language.

Operationally, we will name the Discursive Repertoires of the Table, considering the adequacy of the reported text with respect to the pursuit of the common objective of reducing the spread of the virus. This adequacy is observed in relation to the shared management, i.e., in the definition and adherence to third-party and explicit management rules.

The cohesion output measured by the index is calculated using the following formula:

$$\text{Cohesion Index} = C = \left( \frac{\sum dw}{\sum dm} \right)$$

From the formula, the highest adherence contribution to the Targeting Repertory is created from the use of the Description Repertory, while the minimal contribution is produced from the Justification Repertory use. It is by virtue of the formula result that the social cohesion construct continuum is defined.

The results of the analysis of the texts produced so far by this tool offer, for example, the starting point from which to develop intervention projects on interactions between Community citizens, but also the monitoring of the intervention itself, as well as the evaluation of its effectiveness (in the gap between the result before and after the intervention). The data analysis thus becomes employable in parallel with regulatory-institutional management, in order to increase its impact of effectiveness in interactive terms. The Cohesion Index is used within the Social Cohesion Observatory, a University project aimed at sharing with the Community data concerning the measure of social Cohesion of the Community in an emergency situation, while supporting the Veneto Region in its choices related to the pandemic fallout management.

The Cohesion Index, together with the measurement indexes of discursive interactions regarding a precise configuration of

reality (see examples above), offers a common lens of observation of what happens interactively as a result linked to the COVID-19 spread medical emergency—for instance, the discursive productions about this world crisis, the actions taken, the adopted behaviours, the found criticalities—the indexes make it possible to have available data that can be shared, on the basis of which the effects of the medical emergency can be taken into account interactively in the Community and their management can be scientifically based. The data offered by the Cohesion Index allows the population, starting from the institutional and political roles and task forces built specifically for the management of the emergency, to have data about how the Community is narrating what is happening: for instance, describing and offering shareable considerations, generalising issues, judging what is implemented in the territory, expressing opinions and points of view as regards the perceived concern, etc. Likewise, it allows to consider what possible developments could meet the configuration of the emergency reality in terms of change and its management, against such employed interactive modalities.

An application of the Social Cohesion Index took place in 2019 within the Municipality of Padua (Veneto): within the study conducted, several territorial hubs (citizens, services, businesses, and municipal administration) were involved, including the University. The survey protocols analysed produced data on how respondents narrate their role within the network of interactions in which they are embedded. In both districts considered in the study (Santo-Portello and Arcella), the calculated Generativity gave the output related to the degree of Cohesion: the respondents configure their role according to modalities that keep reality equal to itself, closed to the generation of alternatives (PD equal to 1.03885—**Figure 3**—and 1.605—**Figure 4**). This data constitutes what the public administrative apparatus can refer to in the construction of political choices for the management of the Community, to direct the narrations of the population towards the pursuit of a common objective, in view of Social Cohesion.

By decreasing what the Cohesion Index can offer in terms of measurement, it is possible to assert how, in the uncertainty

<sup>17</sup>As for the Targeting Repertory, it really is a high Dialogical Weight and a medium Dialogical Moment.

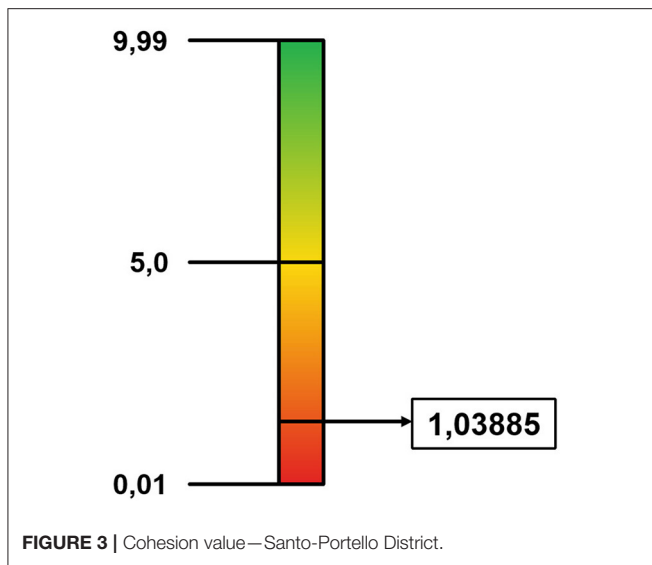


FIGURE 3 | Cohesion value—Santo-Portello District.

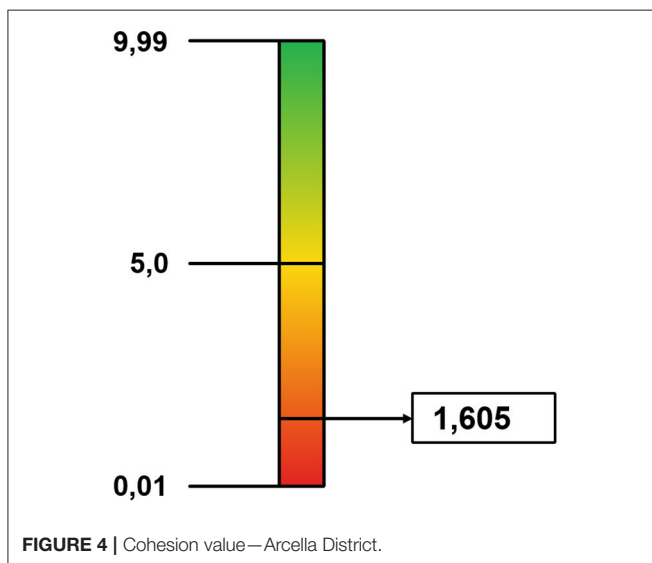


FIGURE 4 | Cohesion value—Arcella District.

of the interaction, every configuration of discursive reality that takes place in the infinite interactions contributes to generate narratives such as “I am not even sick, I would like to go out to dinner but you can’t, it’s like being locked in a cage,” but also “considering that from home I can’t move for legislative provisions, I could take advantage of it to propose a service for the less well-off in medical emergency situations.” Concerning the Social Cohesion construct and its measurement index, the first text exemplified above offers a personal position of the speaker, oriented to the satisfaction of the personal interests of the individual; the second textual example offers a proposal of a citizen oriented to the management, in terms of Shared Responsibility, of the critical aspects emerged interactively, towards the pursuit of the common goal of reducing the spread of the virus. The measure of Social Cohesion is therefore based on what is made available in the discursive modalities of language.

## CONCLUSIONS

The theoretical-methodological proposal described so far, focusing on the Community’s Cohesion and Health dimensions, brings added value to the management of the medical emergency repercussions. The value comes real by the measurement, through numerical data, of the interactive setup characterising the Community in this emergency period pursuing the common goal of reducing the SARS-Cov-2 contagion spread. The focus is placed on the dialogic interactive process leading and concurring to the creation of discursive productions, stances, behaviours, and actions related to the current situation where the human species lives. Added value that, again, is found in the chance, thanks to such measurements, to anticipate even the possible scenarios that could happen against the discursive modalities currently employed by the Community members, allowing for more effective and efficient management. This is made possible starting from the epistemological distinction between Soundness and Health, which makes it possible to consider the former within a purely organic panorama of individual body care, and the latter as part of an interactive plan involving all members of the Community: considering this scientific-fundamental distinction and the formalisation of the interactive-discursive modalities made available by Dialogical Science, the proposal indeed offers indications and rigorous tools for measuring and analysing the emergency context, as well as the possibility of monitoring effectiveness evaluations of the interventions implemented within the network of interactions between the members of the Community (Turchi and Gherardini, 2014b). The Cohesion Index also makes it possible to have the measurement of interactions available, offering shared and common data on which to base the construction of what allows management of the critical issues generated by the medical emergency at an interactive level, brought both by citizens and delegates of the various stakeholders. Such an index, in fact, enables the policy makers and the various management roles to effectively move in favour of the Community living in the territory, i.e., promoting the contribution towards a shared and cohesive management of the current emergency. To say it in simple words, having a datum describing and measuring how and by how much the community interacts, cohesively, adhering to prescriptions related to mask use in social distancing situations, enables the above-mentioned roles to adjust and precisely gauge the legislative prescriptions and their communication in order to maximise their efficacy. Moreover, these data enable the political-administrative roles to find management modalities that can be shared with the delegates of the various labour categories, opening up to scenarios that allow keeping the territory and the Community inhabiting it cohesive and Healthy.

These processes are enhanced in terms of efficiency and cost-effectiveness through the use of Machine Learning, which allows you to have the interactive scientific data you need to operate immediately available, including the margin of error of measurement, on a par with mathematical models. The availability of a scientifically founded measure makes it possible to manage the fragmentation of the way in which medical emergencies are managed, shifting them to the dimensions of

anticipation (and no longer prediction) and shared management with a view to Community Health and Cohesion. In taking charge of interactions between the members of the Community in times of emergency, it becomes possible to effectively support organic research in the medical field, offering the possibility to operate in the management of what happens interactively in the Community, i.e., what is not on a purely organic level.

In perspective, therefore, public policies are in a position to invest in the effectiveness of scientifically based interventions that support the political-administrative roles in the involvement of the Community to manage what happens within it, enhancing the effectiveness of normative prescriptions. At the same time, an efficiency criterion is met when public policies are in a position to manage, by optimising costs, the resources available in an appropriate and coherent way with the Community's own interactive arrangements. These changes can be found in various contexts, such as education and training (distance learning, through internal platforms), work (smart-working), soundness (construction of new intensive care beds or extended working hours for health workers), transport, economy, and so on. At an interactive level, what is generated in the face of the COVID-19 emergency also concerns the interactions between the members themselves, decreased and modified by the measures of isolation, quarantine, and social distance, and compensated by remote communications (video calls, teleconferences, instant messaging, etc.).

A limit to be considered and to be managed during the application of the index and of the naming method of the discursive Repertoires is the human expertise applied to the texts reading and naming process. The naming expertise is taught through *ad-hoc* courses for the application of the naming algorithm, available in literature since 2009 (Turchi, 2009).

Precisely to try to manage this limit, over the last 2 years a research project has been started to measure the human naming mistake, through a collaboration between the FISPPA Department and Padua's Mathematics Department. Such key data

for research enables making the current work (and the research) more accurate.

Finally, we anticipate how, once the medical emergency is over, it will be possible to trace the changes that it has generated in interactive terms in the *Communitas*, which can already be described from the narratives of its members. Through instruments for measuring and evaluating the effectiveness and efficiency of interventions, the proposal of Dialogical Science allows to support public policies through the management in anticipation of the infinite interactive possibilities related to the post-emergency period and the promotion of change in the direction of Community Health.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

## AUTHOR CONTRIBUTIONS

GPT as scientific reviewer was involved in assessing the appropriateness and scientific relevance of the theoretical methodological assumptions used. MSDR dealt with the social cohesion index and the measurement, using the methodology of reference. CC and CM carried out and reviewed the links with other research and projects using the same methodology. LO has been involved in the research and use of scientific literature on the topics. All authors contributed to the article and approved the submitted version.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.559842/full#supplementary-material>

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# Working Under the Gun: A Theoretical Analysis of Stressors Associated With the Re-negotiation of Norms and Control of Work Tasks During COVID-19

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The COVID-19 pandemic has led many of the world's nations to impose numerous preventive and mitigative measures to increase social distance, including various forms of home isolation and quarantine. A central premise for the current paper is that the COVID-19 situation is likely to constitute a massive re-negotiation of social and organizational norms, which may lead to psychological distress at the individual, family and interpersonal level. Virtually overnight, people have to re-define what is expected and deemed appropriate by a given group member in a certain social setting. This goes for all kinds of general social interaction, such as societal, even multinational medical demands on social distancing. Simultaneously it also goes for a sudden, gargantuan re-division of labor in a complex global system. We provide a theoretical analysis of the potential consequences of re-negotiation of norms from the perspective of four sets of psychological theory: Theory of professions; organizational strategic crisis responses; the job-demands-resources model; and theories addressing the interplay between norm violations and psychological distance. From these theories we derive three suggestions that the discussion centers around: (1) The COVID-19 situation leads to a massive re-negotiation of norms related to work, (2) The COVID-19 situation diffuses the demarcation between the various professional arenas and the private sphere, and this diffusion enhances the stress associated with norm conflict, and (3) Norm conflicts are enhanced by digitalization. Our discussion centers on potential stressors associated with the renegotiation of norms, and also includes a few suggestions for practice. For each theoretical suggestion, we give examples of how the suggestion may manifest itself with respect to (a) the work task, (b) the individual's relationship to their leader and/or organization, and (c) interpersonal relationships. We finally point to some theoretical and applied implications.

**Keywords:** benign violations, job stress, crisis management, norms, dual thresholds, counterproductive work behavior, professionalization, leadership

## INTRODUCTION

The COVID-19 pandemic has led many of the world's nations to impose numerous preventive and mitigative measures to increase physical distance between people, including various forms of home isolation and quarantine. By March 30th 2020 it was estimated that such measures affected 43% of the planet's population across 78 nations (Norwegian News Agency, 2020). We argue that such measures may cause a number of social norm negotiations, re-negotiations, and conflicts (e.g., Asch, 1951; Cialdini and Trost, 1998), and we address conflicts that may arise when the majority of the workforce suddenly is instructed to work from home during a situation like the COVID-19 pandemic.

Our main argument is that the current situation is likely to constitute a massive re-negotiation of social, organizational, and behavioral *norms*, which may lead to psychological distress at the individual and interpersonal level (cf. Thompson and Hart, 2006). The interpersonal level includes family, work, and other social interaction. Virtually overnight, people have to re-define what is expected and deemed appropriate by a given group member in a certain social setting. This goes for all kinds of general social interaction, such as societal, even multinational medical demands on social distancing. Simultaneously it also goes for a sudden, gargantuan re-division of labor in a complex global system. What happens to *the work task* stands front and center in understanding the re-division of labor (cf. Abbott, 1988).

In this paper, we address the potential consequences of this re-negotiation for workers in organizations. We are above all interested in the “social construction and sensemaking” close to the individual, which happens at the *nano level* (Thompson and Hart, 2006, p. 231). In other words our focus lies with *behavioral norms* created at the nano level, not the moral principles created at the macro level (Thompson and Hart, 2006).

## RESEARCH QUESTION AND AIM

We address the following research question: What type of role/work stressors is the COVID-19 situation most likely to entail for those who have had to work from home as the result of societal and organizational responses to the pandemic? We provide tentative answers to this question, formulated as a set of suggestions, by combining four sets of psychological theory. In addition, we formulate two more specific propositions that can be tested empirically and that can be used to inform practice.

Our primary aim is to combine existing psychological theory from different areas of psychology in order to provide a theory-based discussion of the types of role/work stressors that are likely to be associated with the COVID-19 situation. A secondary aim is to suggest some theoretical links between the four theoretical approaches, with a particular focus on how the COVID-19 situation exemplifies the general applicability of the Benign Violation Theory to situations of norm violations (cf. Kant and Norman, 2019).

Our discussion centers around the following theoretical suggestions: (1) The COVID-19 situation leads to a massive

re-negotiation of norms related to work, (2) The COVID-19 situation diffuses the demarcation between the various professional arenas and the private sphere, and this diffusion enhances the stress associated with norm conflict, and (3) Norm conflicts are enhanced by digitalization. Our discussion centers on potential stressors associated with the renegotiation of norms, and also includes a few suggestions for practice.

Four features of the COVID-19 crisis are central for our further analysis. First, it is *global*. Second, its nature and the mitigation efforts lead to direct authority-ordered imperative *changes for many forms of social interaction, including working life*, as well as indirect changes through organizational strategic crisis responses. Third, *the pandemic is but one of several associated crisis trajectories* (e.g., Oxfam, 2020). Fourth, the pandemic alone appears to have a *long duration* (Kissler et al., 2020; Moore et al., 2020). Combined with associated crisis trajectories the duration appears more certain and likely even longer.

## THE SCOPE OF OUR PAPER

COVID-19 affects the entire planet. A large part of the population, if not all, has been or will be affected by some form of quarantine measures. During shelter-in-place and quarantine measures, work has to be adjusted or radically changed. Such changes demand social renegotiation related to work. The changes related to work have some commonalities, and some differences. Commonalities may range from hygiene measures to changed work tasks, new job demands, and ambiguous norms. Differences are for the purposes of this paper above all whether it is possible to work from a distance or not.

This paper specifically addresses stressors for those who are currently employed, but who have had to *work from a distance* during the pandemic. For whom, amongst other stressors, ambiguity between the private and the work sphere increases, as does ambiguity between their work sphere and that of household members.

Thus, our paper does not address work life for essential workers who still have a job and have to do it physically present. For instance, health care workers, store clerks, transport operatives, garbage disposal workers, farmers, and many others. We do also not discuss stressors specific to *workers without a choice*, e.g., many in the “gig economy” who are forced out regardless of risks, or even while sick. If they do not work they cannot feed themselves or their dependents. The latter group may also include a larger proportion of those who quickly face unemployment.

However, in spite of the somewhat narrow focus, the implications of our work are potentially broad. This is due to the fact that investigating the chosen population promises more than knowledge for practical solutions during the COVID-19 crisis. It also holds promise for the future, far beyond a couple of 100 million privileged workers today. Understanding social renegotiation of distance work, is for instance relevant: (a) in light of a general digitalization trend; (b) as a seemingly necessary strategy during any future pandemic; and (c) as a

potential strategy against other dilemmas for a rapidly increasing world population, including global warming, large conflicts, and commuting logistics in urban mega-cities.

The aim is to put forward some theory-based suggestions for how the pandemic is likely to influence work life for the individual. Overall, this attempt exemplifies how it is possible to analyze complex situations by combining different sets of psychological theory. We do not aim to present a new theoretical framework to integrate different theories, but rather to show how different theories applied to a larger problem together can constitute the basis for empirically testable suggestions. Since the paper was written at the very start of the pandemic, it does not incorporate empirical evidence of what is so far known about the actual consequences of the pandemic. However, empirical verification or falsification of our suggestions can and most likely will be dealt with by a follow-up paper.

## THE SEARCH FOR RELEVANT THEORY

Our motivation for writing this paper was a deep sigh shared with millions around the globe. In line with everyone else who had to change aspects of their work life from one day to the next, we experienced stress, norm conflicts, and mismatched experiences in relation to our own work obligations and in relationship to work life of other family members. This made us curious as to how we can use psychological theory to understand the stressors and conflicts that characterize work life during a pandemic, and to make predictions about what types of norm conflicts are likely to arise at different levels of analysis.

The selection of relevant theories was based on a combination of different criteria. First, we wanted to include theories that address *norms* for appropriate vs. inappropriate behavior. Second, we searched for theories that were *universal* rather than COVID-19 specific, yet sensitive for crisis conditions. Third, theories had to be applicable to *working life*—in the sense that they describe processes that are regular responsibilities of leaders and managers, and address outcomes of stress and conflict that are likely and measurable among workers. Fourth, they should describe how *dilemmas* may be addressed through choices or negotiations. Our aim was to address a set of theories that would jointly cover a range of levels of analysis (i.e., individuals/dyads/groups/organizations/societies), and that would be complementary to each other and preferably be possible to link to one another.

## THEORETICAL FRAMEWORK

Based on the aforementioned criteria, we selected four theoretical frameworks which constitute the starting point for our analysis. First, we consider *theory of professions* (e.g., Abbott, 1988), which describes general mechanisms of control of work tasks, applicable in dramatic as well as less dramatic times. Mechanisms can be applied from macro to micro levels of analysis; from the societal to the workplace; between as well as within organizations. Secondly, we consider *strategic organizational responses to crisis* (Wenzel et al., 2020), which in turn may strongly moderate

contextual conditions for nano level norms and control of work tasks. Thirdly, we consider the *job demands and resources* model, the JD-R (Bakker and Demerouti, 2007) which can aid understanding how re-negotiation of norms and control of work tasks, as well as the organization's response to crisis may manifest in terms of objective and perceived job demands and resources at the individual nano level. Theoretically and empirically, job demands and resources are typically investigated at the workplace and affecting individuals or small groups. Fourthly, we consider models addressing *psychological distance and behavioral norms*, which can help understand causes and effects of perceived norm violations, not the least at the dyadic and individual level.

## Theory of Professions

Some of the potential conflicts that occur during re-negotiation of norms (e.g., De Dreu, 2010) during COVID-19, may be understood in light of *theory of professions* (e.g., Abbott, 1988). This ecological and systemic theory ranges from lower levels of analysis such as a workplace to societal levels.

A profession can be defined as “any occupation that competes for a work via (...) cultural activity” (Abbott, 2010, p. 176). Professionalization theory has *control over the professional task* as a pivotal point. For example, the medical profession has the exclusive control over sticking knives into people—a strong jurisdiction supported by societal level laws, public opinion, and by procedures and division of labor at the workplace arena. As pointed out by Scott (2008), occupational groups also compete about control over advanced technologies and new kinds of knowledge. Professionalization theory outlines a systemic and perpetual contest over such control. Clearly the COVID-19 situation leads to issues concerning control of professional tasks, advanced technologies and new kinds of knowledge.

Professionalization theory is well-suited to explain how the system of professions is influenced by various crises, as well as political or technological changes. Thus, the processes may work over time, or in intense bursts.

The mechanisms may work on a societal level, on a legal arena, or on a workplace arena. Furthermore, the mechanisms are the same *between* professions and *within* professions. Thus, domino effects may occur on several levels, and between and within entities.

Various external shocks, such as technological or demographical events, may reshape the conditions of the perpetual conflict in which professions normally exist (Abbott, 2010, p. 176). The COVID-19 situation clearly involves such “shocks.” The scale, the number of simultaneous and consecutive shocks, and speed associated with COVID-19 are notable. Severe shocks force different types of organizations to choose strategic crisis responses (see the section “Strategic responses to organizational crisis”).

An important point is that legitimate control of professional jurisdictions (Abbott, 1988) requires *legitimacy*—“the belief that authorities, institutions, and social arrangements are appropriate, proper, and just” (cf. Tyler, 2006, p. 376). Legitimate professional control may connote a jurisdiction or area of authority which is defined by law, but also by perceptions in the public eye, or by *psychological contracts* (cf. Thompson and Hart, 2006)



at the workplace arena. How people think about such social arrangements greatly influence their willingness to defer to them (Tyler, 2006).

An individual's behavior may be guided by personal conviction. However, notions of professional theory, legitimacy, and psychological contracts clearly point to the power of shared thinking on effective behavioral norms. In the case of stretching, breaching or fully breaking existing psychological contracts, we need to understand how perceived legitimacy and according deference to contracts may begin to waver.

To sum up, changes relating to control of work tasks may relate to who controls the work tasks; who or what has oversight, surveillance, and sanctioning rights (Dzieza, 2020); the relative importance of different work tasks; the status associated with various roles/tasks; the boundaries between professional and private tasks and responsibilities. Changes may also shift the balance of tasks performed in physical proximity vs. distally/digitally. We now turn to each of these shifts.

## Strategic Responses to Organizational Crisis

An organizational crisis occurs when the normal organization, resources, points of reference and sense of meaning are no longer sufficient (cf. Pearson et al., 2007; Narotzky and Besnier, 2014). This would be the case for many organizations during COVID-19. In times of crisis the regular division of labor is not enough, especially when the process of crisis escalation is vague and prolonged (Jacques et al., 2007; Buchanan and Denyer, 2013). Management may thus be uncertain about appropriately mobilizing crisis responses, thus displaying passive or *laissez-faire* leadership (Lewin et al., 1939; Skogstad et al., 2007). The daunting task of controlling the uncontrollable during crises, can even lead to destructive passivity.

In a recent review, Wenzel et al. (2020) present an overview of papers that address ways in which organizations can respond to crises. Wenzel et al. identify four broad categories of organizational strategic responses to crises. These are *retrenchment*, *persevering*, *innovating*, and *exit* (Wenzel et al., 2020).

*Retrenchment* involves reducing costs, assets, products, or overhead (Pearce and Robbins, 1994, p. 614, in Wenzel et al., p. 9). This causes the organization's business activities to narrow. A potential result is often a net loss for the organization, and may be detrimental in the long run. A different strategy is *persevering*, where attempts are made to sustain the organization's activity. It can be seen as a "status quo" strategy. In the initial stages of a crisis, *persevering* may be a rational strategy for various reasons, including the need for more information about the estimated nature and duration of the crisis. However, as pointed out by Wenzel et al. (2020, p. 10), this strategy only works in the medium run, with "slack resources" available. Passivity could be seen as a variety of *persevering*. *Innovating* involves a change, broadening, or renewal of the organization's scope of business activities. Wenzel et al. (2020) argue that *innovating* is likely to be beneficial in the long run, and sometimes key to survival of the organization. *Exit* means that the organization discontinues

with its activities. Whether an organization chooses this strategy depends on a number of factors, including the nature of the crisis and strategies at earlier stages of the crisis. Sometimes, exit is unavoidable. At other times it may be a deliberate strategy.

With a scope as in the current pandemic, all types of organizational responses, even initial *persevering*, may eventually lead to great change. We propose that these organizational responses constitute central vessels bringing the change into the work arena. In particular, vessels for change concerning the control of work tasks, and the demands and resources associated with work tasks.

## The Job-Demands-Resources Model

Thirdly, closer to the individual, the *Job-Demands-Resources model* (JD-R; Bakker and Demerouti, 2007), sheds further light on processes concerning work tasks: how changes in demands and resources influence what happens from an organizational level of analysis down to the individual. A sense of control is part of the backdrop to the JD-R model and its resources, for instance as manifested by the name of the earlier *demand-control model* (Karasek, 1979) which the JD-R extended.

The JD-R model has been central for understanding the interplay between two categories of factors that determine the level of stress in a given job situation. Both categories of factors can refer to physical, psychological, social, or organizational aspects of the job. On the one hand, *job demands* refer to job aspects that come at a cognitive and/or emotional cost and may lead to stress, because they require sustained effort or skills. *Job resources* refer to those job aspects that help the person to achieve their work goals, reduce job demands, and/or stimulate growth, learning, and development. Job resources can counter the effect of job demands, but are also valued in their own right (Bakker and Demerouti, 2007). Importantly, both sets of factors can operate at different levels of analysis, including at the work task, leadership/organizational, and interpersonal level. An important assumption of the JD-R model is that job strain and job motivation are influenced by two different psychological processes. Thus, it can be seen as a dual process model (Bakker and Demerouti, 2007). Job demands and resources also interact. For instance, according to the "buffer hypothesis," job resources can modify the negative effect of job demands on perceived stress (Bakker and Demerouti, 2007).

The JD-R model also acknowledges that *personal resources* (Bakker and Demerouti, 2007) can mediate the relationship between job resources and job engagement, but not buffer job demands on their own (Xanthopoulou et al., 2009). This is relevant during the COVID-19 pandemic, with workers exposed to both increased social demands and reduced job resources.

Bakker and Demerouti (2007) point out that job stress and motivation not only predict job demands and resources, but can also be outcomes of the two. For instance (poor) worker behavior may lead to increased demands and reduced resources over time. Also, a dark perception of demands and resources may lead to a deteriorating work climate and objective worsening of demand-resource combinations. Such reversed causation requires attention to other causes of job stress and motivation.

We suggest that the fourth theoretical framework below is useful for this end.

## Models Addressing Psychological Distance and Behavioral Norms

When norms are re-negotiated, this implies changes to what is perceived as acceptable vs. unacceptable, both at the nano level, interpersonal level, and societal level. When psychological contracts are stretched in a manner that violates one's expectations, this violation may be perceived as either benign/legitimate/acceptable or malignant/illegitimate/unacceptable.

*The Benign Violation Theory* (henceforth BVT; McGraw and Warren, 2010; McGraw et al., 2014) explains how emotional responses to norm violations depend on whether the violation is regarded as benign or malignant. This is originally a theory of humor, but can be applied to other situations in which a norm violation leads to emotional reactions (Kant and Norman, 2019). For something to be regarded as funny, two types of appraisal must be present simultaneously. First, something must violate expectations of how something "ought" to be, e.g., violating a linguistic norm. Second, this violation must be perceived as benign rather than malignant and hurtful. As Kant and Norman (2019) argue, other dual threshold models of social behavior describe a similar process where behavior may violate some expectations or norms, while being acceptable in a sweet spot prior to passing into the unacceptable. For instance, concerning anger in organizations (Geddes and Callister, 2007), leadership, or extra-role behavior at work (e.g., Spector and Fox, 2010).

In this paper, we refer to "mismatched experiences" and/or "mismatched sweet spots" in cases where a norm violation is perceived as benign by one person and malignant by another, resulting in different emotional reactions. The term psychological distance is important for understanding norm violations and mismatched experiences (Kant and Norman, 2019). According to *the construal level theory (CLT)* of psychological distance (Trope and Liberman, 2010), something or someone may feel closer or further away in terms of geographical distance, social distance, temporal distance, and hypotheticality. Something which is further away is represented more generally and abstractly, whereas something which feels closer is represented more concretely.

Telecommuting in general, and the COVID-19 situation in particular may influence psychological distance in all its dimensions. Geographical or physical distance to coworkers and leaders is typically increased, particularly so during the pandemic with mitigation strategies against contagion. Interaction frequency may go down, but also increase through online work environments. Social distance—not the least in terms of power asymmetry—may increase, become more unclear, and conceivably also decrease. Psychological distance to people in the same household may move in an opposite direction. The psychological distance to work tasks may also change.

Of special interest here is *leadership distance*, which can be understood in terms of three dimensions, namely, *leader-follower physical distance*, *perceived social distance*, and *perceived task interaction frequency* (Antonakis and Atwater, 2002). Leader-follower physical distance refers to the geographical distance

between leader and follower. Perceived social distance refers to differences in status, rank, authority, social standing, and power. These are assumed to influence perceived intimacy and social contact. Perceived task interaction frequency refers to how often the leader and follower interact, either face to face or digitally.

Geographical and temporal distance moderates norm violations (McGraw et al., 2014). When something *feels* close to us, it takes a smaller violation for it to be considered malignant. A higher intensity is possible when distance is greater. Sweet spots in leader-follower interactions related to the dimensions of leadership distance have also been substantiated empirically (Vanderstukken et al., 2019; Gouldman and Victoravich, 2020; Hernández et al., 2020).

Third, differences in perceived psychological distance between two parties may cause mismatched experiences of whether a violation is benign or malignant (Kant and Norman, 2019). Also, the relative distance to the norm-violation itself (here the work task or changes in demands or resources) works in the same way. For instance, the psychological distance to other parties or to a norm-violation will likely be experienced differently by a high-power party—such as a leader, an official, or a member of a dominant social group, compared to a low-power party—such as a worker, citizen, or member of a subordinate group. The changes and renegotiations during COVID-19 should therefore be considered in terms of their potential for mismatched experiences.

## DISCUSSION

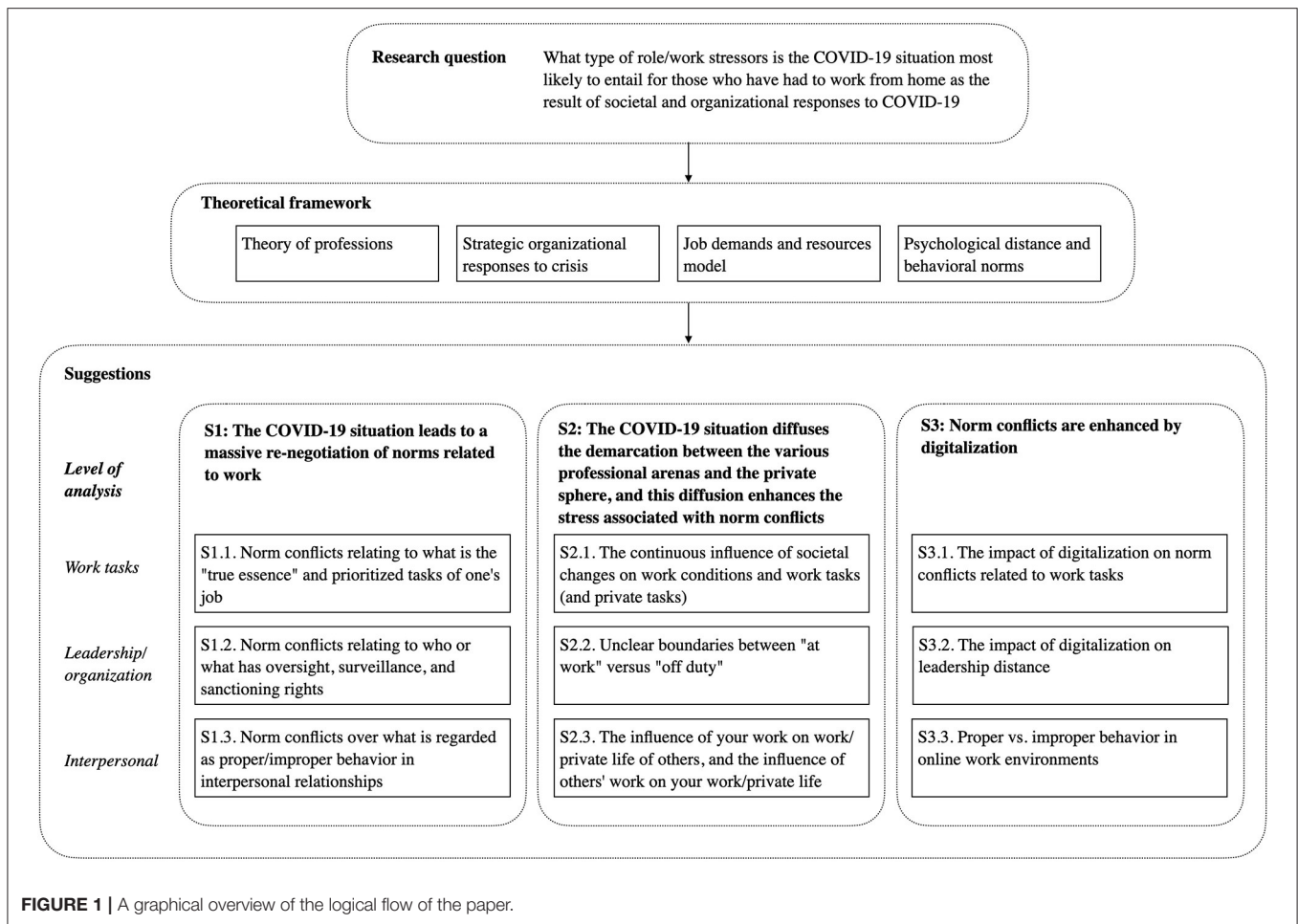
We now present 3 theoretical suggestions for what type of role/work stressors the COVID-19 situation is most likely to entail for those who have had to work from home as the result of societal and organizational responses to COVID-19. The stressors are related to different factors over which people currently have to re-negotiate. These suggestions are derived from our knowledge of the four sets of theory presented in the previous section of the paper.

For each suggestion, we first give a general introduction to what the suggestion implies at a general level. We then provide 3 sets of examples, at the level of the *work task*, *leader/organization*, and *interpersonal relationships*, respectively. We supply a graphical overview of the suggestions in **Figure 1**.

### Suggestion 1: The COVID-19 Situation Leads to a Massive Re-negotiation of Norms Related to Work

The COVID-19 situation involves multiple, massive changes at the societal, organizational, dyadic, and individual levels. People have to reorient themselves about what is expected, acceptable, etc. We refer to the process of establishing new norms as "re-negotiation of norms." We will address 3 sets of factors over which people now have to re-negotiate. There may also be other factors.

Using the terminology of the Benign Violation Theory (McGraw and Warren, 2010), norm re-negotiation implies that what yesterday was acceptable behavior, may today be unacceptable. To use the terminology of BVT: The dual



thresholds have moved. Different parties may experience different shifts in dual thresholds, the contextual premises, and psychological distance to other parties and to the subject matter. In line with our hypotheses put forward elsewhere (Kant and Norman, 2019) we therefore expect *widespread and frequent experienced norm violations* of both benign and malignant nature during COVID-19. Above all, we expect many *mismatched experiences*, where one party perceives a violation where the other does not.

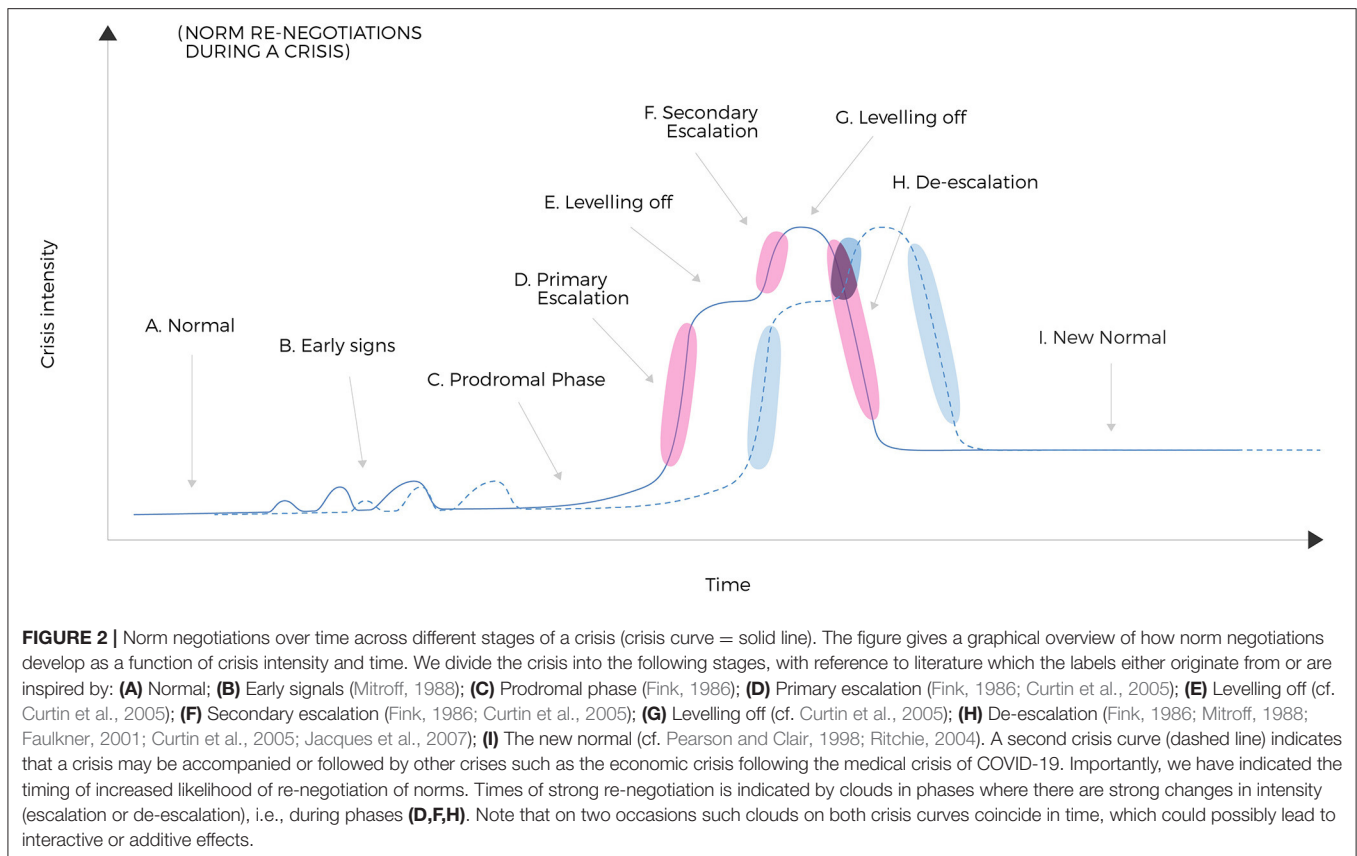
Moreover, we suggest that *the mere re-negotiation of norms could itself be seen as a stressor*. Re-negotiation is a general stressor in society, and a variable that increases perceived job demands in connection to work (cf. Bakker and Demerouti, 2007). By this we mean that both *uncertainty* ("Is task X important anymore?" "By which authority am I to do the old X or the new Y?" "Will I get paid for doing X or Y?") and *change* ("It seems I can't carry on doing what I normally do.") might demand more of the individual. The *result* of this re-negotiation ("I have to do more of Y and less of X." "I seem to have less autonomy doing Y") could also be demanding.

The violation of norms is likely to be strenuous: cognitively as represented in the previous questions, and by a more than usual

need to suppress, enhance or fake emotions (cf. Glasø et al., 2006; Gailliot et al., 2007; Bushman et al., 2014).

Importantly, norm re-negotiation could take place overtly—with people being aware that re-negotiation takes place. Yet, it might also occur covertly—with people being unaware of the re-negotiation process or how their communication might be perceived. Regardless of people's awareness of the process, we expect that most people are tired, confused, and step on each other's toes more than before.

We specifically hypothesize that the intensity of social renegotiation is positively correlated with the slope of change in crisis intensity (both increasing and decreasing slopes). We provide a tentative, graphical overview over how we hypothesize the intensity of re-negotiations of norms will vary across different stages of a crisis (see **Figure 2**). Our overview builds on established research on how a crisis is known to develop (see references in caption to **Figure 2**). Simply put, we predict re-negotiation to peak while societies close down as well as when they are opening up. During lock-down, particularly with prolonged duration, temporary settlements will calm things down. During a de-escalation phase (e.g. Fink, 1986; Mitroff, 1988) we however hypothesize greater variance in norms and



behavior, than during the escalation. Thus, norm conflicts may increase even more during de-escalation.

### The Level of Work Tasks: Norm Conflicts Relating to What Is the “True Essence” and Prioritized Tasks of One’s Job

The first set of factors over which workers have to re-negotiate, concerns the work tasks. Some central questions are: *What is the “true” essence of my job? Which are the prioritized core tasks? What is true in a short term crisis vs. a long term one?*

#### Changes in Nearly all Aspects of Work Tasks

Physically moving one’s workplace from the site of the organization to one’s home, may require brutal prioritization of certain tasks at the cost of others. First, there might be work tasks that simply cannot be conducted from a distance or digitally, i.e., by telecommuting. Second, the work situation might lack sufficient time and resources to do all the tasks one normally is responsible for. In theoretical terms—a sudden shift in job demands and resources (cf. Bakker and Demerouti, 2007). Possibly related to limitations to technical equipment, or having to distribute one’s time between work and taking care of quarantined household members. Third, the organization’s crisis response (cf. Wenzel et al., 2020) could cause changed task prioritization.

#### What Is the Essence of My Job?

Especially with organizational retrenchment or innovation crisis responses, workers are forced to consider the “true” essence of their job. Some might have to do the tasks of the lost workforce. Someone in an organization suddenly re-defining its goals and priorities, might have to use their skills differently. With an organization that attempts the perseverance strategy, the initial phase will likely lead to differentiated work-load and prioritization of work tasks within the organization. Some, like crisis managers and IT-technicians, may have an intense workload with both old and new work tasks. Others may have very little to do, and ambiguous conditions for taking initiative, prioritizing, and even being visible (cf. Elsbach et al., 2010).

#### Unclear Expectations and Lack of Choice

One thing is what happens to explicitly defined tasks, i.e., tasks that are clearly described and with clear expectations. Another is what happens to tasks that are less clearly defined, and to possible flexible space in between tasks. With a crisis and some response strategy declared, the first casualty in professional control and autonomy (cf. Abbott, 1988) is likely the flexible space in between work tasks, much like the short seconds in between tasks at the conveyor-belt (cf. Dzieza, 2020). Less clearly defined tasks may still be expected to be performed, but without time or other resources. New tasks may similarly have been added, without time, resources, or even pay. The teacher may have to do janitorial and cleaning tasks in the partially opened school, at the same



time as having to be a purchaser of IT gear at home, performing janitorial tasks at home, and providing tech-support for the home-schooled children. This in addition to revising curriculum and pedagogical methods to suit the new constraints either in a partially opened school, or in an entirely virtual format.

Meeting the expectations heavily dictated by the organization's chosen strategic crisis response (cf. Wenzel et al., 2020) may thus be a conflicted battle between nominal core tasks on one hand, and implicit, new, and other people's tasks on the other. This, while interstitial "empty" time slots likely have disappeared.

What if a worker tries to say no? Strongly attempting to enforce previous "peacetime" division of labor and work tasks may be perceived as a malignant violation (cf. Kant and Norman, 2019) by leaders and colleagues, even by family members in a shelter-in-place situation.

Should workers display *counterproductive work behavior* (CWB, Spector and Fox, 2010), then increased job demands and reduced job resources could follow, as specified in the JD-R model (Bakker and Demerouti, 2007). Their *negative perception* of available JD-R may also lead to a deterioration. A mismatched perception as described by Kant and Norman (2019) with psychological contracts violated (Thompson and Hart, 2006) may thus lead to both of those mechanisms for reversed causation in the JD-R (cf. Bakker and Demerouti, 2007). If violations in the eyes of workers are experienced as *illegitimate* (cf. Tyler, 2006) worker behavior or perception may be even worse.

### ***Re-negotiation as an Opportunity***

For some, renegotiation is an *opportunity*. Turmoil provides opportunities to grab new jurisdictions for entire professions (Abbott, 1988), and new market shares and innovations for organizations (Wenzel et al., 2020). Also, at the workplace level, individuals may completely fulfill every expectation, thus demonstrating that they are essential workers and at least should be prioritized to continue having a job. They may even display desirable *extra-role behavior* such as *organizational citizenship behavior* or OCB (Spector and Fox, 2010) meriting for new responsibilities or even promotion. Incidentally, we consider the latter to be a potential for the reversed causality in JD-R. Yet, the opportunities for the worker may lead to violations from the employer to be experienced as benign, and thus help them cling on to the edges of the best JD-R quadrant (average strain and high motivation) rather than dropping into the worst as perhaps otherwise expected (cf. Figure 7 in Bakker and Demerouti, 2007, p. 320). Thus, the same basic mechanism of shifting norms—moving goal posts—may explain why leaders suddenly may perceive the worker's helpful OCB as harmful CWB, and why workers suddenly may perceive constructive leader behavior as destructive (cf. Einarsen et al., 2007). This mechanism may be a useful contribution in answering the question Spector and Fox (2010) pose about the relationship between OCB and CWB.

The first step for taking advantage of the opportunities is probably hitting the sweet spot of one's leader, and perhaps colleagues. Can it be an acceptable violation in the short term? Then perhaps it can be a winning gamble in the long term. To a degree this poses an individual level parallel to the organizational strategic crisis responses. Yet, many are not at liberty to choose at

all. They may instead experience extreme versions of professional or workplace lock-in (Aronsson et al., 2000).

### **The Level of Leadership/Organization: Norm Conflicts Relating to Who or What Has Oversight, Surveillance, and Sanctioning Rights**

The second set of factors over which re-negotiation now takes place, concerns power distribution: During the COVID-19 pandemic, who or what has oversight, surveillance, and sanctioning rights? For the focus of the current paper, these questions mainly concern the individual's work tasks. However, an understanding of oversight, surveillance, and sanctioning rights of an individual's work tasks also requires power distributions at a societal level.

### ***Above and Beyond the Call of Duty***

At a workplace arena, norm conflicts get close to the actual work tasks and the individuals performing them. Irrespective of the organization's strategic crisis response (cf. Wenzel et al., 2020), there will likely be discussions around demands beyond what workers are contractually obliged to do, to ensure the survival of the organization or to help clients. Such requests "above and beyond the call of duty" tap into the realm of extra-role behaviors such as OCB and CWB (Spector and Fox, 2010). Such requests are vague in the sense of being open ended, lacking contractual descriptions, and not waiving the worker from doing all the regular tasks. Especially workers who experience threats to their employment, may attempt to meet both the nominal and the vague OCB expectations. In terms of the JD-R model this constitutes an increase in demands, reduction of resources and control (cf. Bakker and Demerouti, 2007), which in itself approaches unhealthy work conditions (Karasek, 1979). If combined with fear of losing one's job, the *lock-in effects* come into play, further straining the worker (Aronsson et al., 2000). Who actually asks for the OCB, judges and sanctions whether it has been fulfilled, is likely to be unclear to the individual worker. If it is equally unclear which resources are available, and where their responsibility begins and ends in relation to other work tasks of other workers—the norm conflicts have truly landed in the individual.

### ***Exploiting Norm Conflicts***

Norm conflicts can also be exploited, both by individuals and groups, including professions. When previous jurisdictional settlements are upended opportunities may reveal themselves (Abbott, 1988). Individuals or groups may be able to get defined as an essential worker, or expand their jurisdiction into more attractive and lucrative tasks. Organizations may be able to grab market shares or venture into new markets. We must remember that (a) norm conflicts carry the seed of both threats and opportunities, and (b) they exist in a system, where movement in one part often influences other parts. This realization is helpful not only in understanding resistance or absence of it toward change (cf. Oreg, 2006). It is also helpful in practice to avoid these processes stealing unnecessary energy.

## The Interpersonal Level: Norm Conflicts Over What Is Regarded as Proper/Improper Behavior in Interpersonal Relationships

In a situation where norms are negotiated or re-negotiated, there is a potential that the perception of norms and norm violations differ between individuals (Kant and Norman, 2019). Thus, to understand norm re-negotiation, we need to also turn to the interpersonal level.

### *Norm Violations: the Line Between the Acceptable and the Unacceptable*

Everyday social interaction at work may be tricky. For instance, while one person might find it acceptable to start the working day an hour later than usual during the lockdown, another might find the same behavior unacceptable. Moreover, a norm violation seen by one person as benign, could be perceived as malignant by another. Using the same example, even if two people agree that the COVID-19 situation should not influence when the working day starts, one person might find it funny that another person gets up an hour late, while another could find it unacceptable and annoying. In terms of the BVT (McGraw and Warren, 2010), the “sweet spot” of different people is mismatched. The risk of this could be increased for a number of reasons during COVID-19. Multiple norms are re-negotiated, and for many people in telecommuting conditions, re-negotiation also takes place largely without face-to-face communication. Accordingly, it becomes more difficult to perceive each other’s subtle social signals, including those that communicate what is acceptable and unacceptable. In essence, the limited cues known from virtual teams and telecommuting gets paired with low skills in virtual social interaction (cf. Arvedsen and Hassert, 2020), and paired with an entire norm-system in turmoil.

Re-negotiation of norms in combination with less face-to-face interaction increases the risk of norm violations, which has a number of potential implications. One is that humor becomes a riskier activity. When moment-to-moment social feedback is lacking, it also becomes more difficult to judge what is morally/ethically correct. Another is that leader–follower interaction and leadership pertaining to interpersonal behavior becomes more difficult.

### *Interpersonal Difficulties in Crisis Organizations*

Three phenomena can illustrate how organization or group level norm conflicts may cause difficulties at the interpersonal level. If awareness, leadership, and crisis management training are lacking, then navigating the new developing norms is likely to be tricky. Knowing basic dance steps is simply advantageous. If no one knows a single step—someone is bound to get stepped on.

First, leadership in crisis may become *heterarchical* as opposed to hierarchical (Nesse, 2017), with multiple formal and informal leaders assuming and giving responsibilities away. In a trained organization this may work well (Nesse, 2017). However, the potential vagueness, role ambiguity or outright role conflicts (Wong et al., 2007) may prove highly troublesome in organizations or teams that are unfamiliar with these new roles (cf. Espevik et al., 2006).

Second, *shared mental models* are important cognitive phenomena during crises (Cannon-Bowers et al., 1993), necessary for establishing of clear roles, shared situation awareness and shared mental models about goals and solutions. Carrington et al. (2019) showed that in prolonged crises, many shared mental models about solutions emerged from the ranks or from lower management levels. If higher management and the organization are unable to communicate and listen well, the best solutions may be overlooked, or even considered malignant violations.

Third, organization level thresholds for behavior, e.g., concerning displays of emotion, may change. A crisis rigged organization is different from the everyday organization. The sense of urgency and narrowed scope of objectives may change norms for interpersonal behavior. Empirically, the dual thresholds (cf. Geddes and Callister, 2007; Kant and Norman, 2019) was found to shift for crisis managers’ aggressive behavior (Larsson et al., 2001): expressing some anger and other emotions was more tolerated, even expected. Yet, the maximum acceptable expression was reduced. In other words, more welcome to show, but with a stricter upper limit. However, workers may be less welcome to show any aggression—needing to inhibit, to perform emotion work in order to keep their job (cf. Glasø et al., 2006). The norms for displaying other emotions may similarly be shifted in line with dual threshold models (cf. Geddes and Callister, 2007; Kant and Norman, 2019). Displays of joy in a hospital ICU-unit, or jokes at the COVID-19 presidential task force press briefings may have changed norms.

### *Emotional Responses to Perceived Malignant Violations*

In addition, follower frustration and their behavior may bring existing norm conflicts to the surface, particularly in the eyes of leaders. If we consider that workers may experience the re-negotiation process, the (limited) level of support from leaders and the organization (cf. Bakker and Demerouti, 2007), the resulting work tasks (see section The Level of Work Tasks: Norm Conflicts Relating to What Is the “True Essence” and Prioritized Tasks of One’s Job) and associated new control as *malignant violations* (cf. Kant and Norman, 2019) the perceived strain would likely increase even more. If the worker experiences malignant violations, the most immediate outcome is *emotional responses* (cf. Warren and McGraw and Warren, 2010). Merely *inhibiting emotions* is literally energy draining—each act of inhibition gnaws on one’s glucose level (Gailliot et al., 2007), and could result in the display of counterproductive behavior (Bushman et al., 2014). Even under normal circumstances, workers and leaders engage in a lot of *emotion work*—inhibitions and exaggerations of actual emotions (Glasø et al., 2006). It is fair to expect that emotion work gets even more intense when uncertainty is high, when norms are unclear, and when employment is at risk, as during COVID-19. As mentioned in The Level of Work Tasks: Norm Conflicts Relating to What Is the “True Essence” and Prioritized Tasks of One’s Job, the strain of inhibition and emotion work, and the emotions themselves may fuel both perception and behavior, which may have a detrimental impact on job demands and resources (cf. Bakker and Demerouti, 2007).

Extra-role behavior may be both desirable and highly undesirable. Perhaps a steep curvilinear effect may be found in high turmoil/crisis conditions. It is conceivable that some OCB—above and beyond the normal call of duty—is expected, but not much, lest you quickly irritate colleagues and leaders by doing anything but the core tasks.

## **Suggestion 2: The COVID-19 Situation Diffuses the Demarcation Between the Various Professional Arenas and the Private Sphere, and This Diffusion Enhances the Stress Associated With Norm Conflicts**

A premise that might shape the nature and outcome of re-negotiation of norms, is the fact that societal restrictions following COVID-19 has caused different arenas to be “merged” into people’s homes. Discussions and negotiations normally belonging to the societal and organizational arenas, now occur in the home arena. For instance, active negotiations with one’s boss about the distribution of work tasks, could occur in the bedroom. Board meetings have people working from their living rooms, kitchens, bedrooms, etc.

One implication is that the demarcation between various professional arenas and the private sphere, is diffused. In the following, we exemplify how this diffusion may enhance the stress associated with norm conflicts at the 3 levels of analysis.

Our suggestion is that the technological and demographic changes (or “shocks”) occurring as a direct or indirect result of COVID-19, may reshape the conditions of the perpetual conflict professions normally exist in (Abbott, 2010). They also influence work and private conditions of individuals more and quicker than under normal circumstances.

According to theory of professions the struggle about control of work tasks occurs in 3 arenas: the workplace, the public arena, and the legal arena (Abbott, 1988). In the current pandemic, the private sphere is no longer separate from the classical three arenas: This demarcation becomes more diffuse and permeable. Re-negotiation appears to occur in all three arenas as well as the private sphere, simultaneously or nearly so.

We will mainly discuss re-negotiation of social norms in the work arena for people currently working from home. In addition, we point to how the COVID-19 situation challenges professionalization theory’s assumption that changes occur at a higher pace in the work arena, followed by the public and legal arenas. For example, some recent changes in the work arena could be seen as direct consequences of more rapid societal changes.

### **The Level of Work Tasks: The Continuous Influence of Societal Changes on Work Conditions and Work Tasks (and Private Tasks)**

The COVID-19 situation is like a rhinoceros in a china shop: some professional tasks are put on hold over night (e.g., restaurants, hairdressers, and travel workers), whereas others have a corresponding increase in demand (e.g., health care nurses, laboratory testing, producers of antibacterial liquid),

and new ones previously unclaimed ones have emerged (e.g., new business ideas like 3D-printing of face visors on a 1,000 home computers).

The theory of professions (Abbott, 1988) describes how radical changes in control of professional tasks lead to domino-effects, conflicts and re-negotiations. Accordingly, we would expect all three arenas of jurisdictional contest to be in turmoil during COVID-19. Moreover, the changes in all arenas may occur in different ways and in a different order than normally.

Typically, the legal arena is slow to change, the public arena is more dynamic, and the workplace arena is the most dynamic. Presently the workplace arena not only has moved into your home, it is also in minute-to-minute flux, the public arena is changed every week or even day, and the legal arena is also moving fast with new legislation swiftly made. Furthermore, one could hypothesize that the typical sequence has changed. Instead of laws generally being changed after public opinion, authorities have established laws before or even contrary to public support. Authorities set normal laws aside, and start using rarely used or even obsolete laws.

A common sequence during COVID-19 has been that the prime minister has executed direct orders—for schools to shut down, people to shelter-in-place, curfews, and so on. Accordingly, the prime minister’s order created an involuntary serviced office in your bedroom. Suddenly a number of organizations who never interact had to collaborate: the employers and schools of the household members sent their work tasks into the same bedroom. A need for resources emerged, for desks, Wi-Fi, and computers. Issues of ethics, health, and security unanswered, and which organization would be responsible for anything else than the demands on their workers. In theoretical terms: with great ambiguity concerning job demands and resources (Bakker and Demerouti, 2007), contracts psychological (Thompson and Hart, 2006) and legal alike, as well as norms for appropriate behavior (Kant and Norman, 2019).

However, societies seem to approach formulating, implementing and communicating their influence differently. The clarity and firmness vary, reminiscent of the norms of tight and loose cultures (cf. Gelfand et al., 2011). China and Norway implemented clear and strict rules early, e.g., with laws and police sanctions against staying at summer houses in Norway. Sweden implemented recommendations, which seemed more to play on internalized norms, lest one was to suffer shame and annoyed looks. The federal administration of the US, however, presented vague, inconsistent and contradictory statements, particularly from President Trump himself. Trump’s statements were often in stark contrast to those of medical expertise and other officials (cf. Brennen et al., 2020; The Lancet, 2020). The gradual opening of societies has largely followed similar patterns. How well these strategies will work is a question for future research. We hypothesize that the looser strategies will increase variance in norms and behavior, and accordingly result in more norm conflicts, in particular as societies open up. Thinking ahead and creating predictability is part of elementary crisis management in order to proactively combat the main problems, and also part of minimizing the turmoil associated with re-negotiation of norms.



Societal changes in the public arena may also influence work tasks. Poor workers who have no choice to telecommute, may work under the gun to provide for their families (cf. CNN, 2020; Lind, 2020). They may be forced to work under conditions contrary to authority recommendations, or to view the latter as illegitimate (cf. Tyler, 2006) and end up at the state legislature of Michigan with guns.

Public events may lead to sudden changes for entire professions and their work tasks (cf. Abbott, 1988). An example concerns the debate on professional tasks for the US police force which surged following the killing of George Floyd by police, in the midst of the pandemic (Hill et al., 2020). Strong arguments were made to “defund the police”, in terms of stripping funds and professional tasks such as dealing with substance abuse, marital interventions, homelessness, and many other tasks from the heavily funded and heavily armored police.

### The Level of Leadership/Organization: Unclear Boundaries Between “At Work” vs. “Off Duty”

In the COVID-19 situation, a vast number of (mostly) office workers have had to move their workplace to the home arena. For most, this has happened suddenly and without sufficient time to make optimal adjustments to technical equipment, furniture, etc. In addition, many have household members in a similar situation. For instance, one’s partner might be working from home, and children in the household be home schooled or stay at home because childcare is closed.

In this situation, drawing the line between being “at work” vs. “off duty” may feel even more difficult than usual. One reason is reduced physical distance between the home and work arenas. Combined with various government recommendations/regulations that restrict people’s opportunities for transport, leisure activities and social contact, this could result in feelings of constantly being “trapped” in a semi-work situation where it is difficult to declare to oneself and to others that “I’m off duty.”

### Perceived Psychological Distance to the Organization

Related to this is the perceived distance between the individual and the organization. Chen and Li (2018) have specifically looked at employee-organization psychological distance, in an attempt to better address interpersonal psychological distance, which they argue is limited in CLT (Trope and Liberman, 2010). Chen and Li (2018) constructed and tested a self-report inventory to measure the various dimensions of employee-organization psychological distance. We here briefly outline each of these suggested dimensions. *Experiential distance* refers to how the individual perceives the future of the organization, based on how they assess a current experience or trend. *Behavioral distance* is the individual’s perceptions about their affinity for the organization. *Emotional distance* refers to individual’s emotional experience in corresponding and interacting with the organization. The authors exemplify this as the perceived “sense of oneness,” “sense of honor,” and “sense of experience.” *Cognitive distance* is the individual’s perceived affinity for their organization, in terms of value orientation and personality consistency. *Spatial-temporal distance* refers to how close the individual feels that

the organization is in space and time based on their level of involvement and understanding. Finally, *objective social distance* is the felt distance to the organization based on how closely one identifies with it.

### COVID-19 Leading to an Increase in Emotional and Spatial-Temporal Distance to the Organization

Working from home during COVID-19 might in particular increase the employee’s emotional and spatial-temporal distance to their organization. The organization’s “affinity” for the worker may be reduced if the worker is less visible (cf. Elsbach et al., 2010). If the organization is at risk, it could also increase experiential distance. At the same time, other forms of employee-organization psychological distance could be reduced in the current situation. This applies in particular to cognitive distance, cf. the fact that any major crisis could force an organization to re-define and/or communicate more clearly around its core values.

As described earlier (The Level of Work Tasks: Norm Conflicts Relating to What Is the “True Essence” and Prioritized Tasks of One’s Job), COVID-19 may influence distance to the work task. Especially for telecommuters, the work task may come extremely close, invading every aspect of private life. This could be even when the organization itself and its members would feel unusually distant. Norm violations include not only two parties, but a violating act such as a changed work task or job demand. Kant and Norman (2019) suggest that psychological distance needs to be considered between the two parties, the violating act, and the relative relationship between the three. Thus, we think that adding the work task and the relative distance between the task, the organization and the individual worker, may be an interesting amendment to the Chen and Li (2018) view of the relationship to the organization as an interpersonal relationship between two parties.

Overall, leaders should attend to decreasing psychological distance to job resources, and to increasing psychological distance to job demands (cf. Bakker and Demerouti, 2007). At least markedly protect against unnecessary invasion of private, off duty life. This may be hard for leaders in a crisis situation, where their knee-jerk reactions are likely to attempt increased control, and sending out signals whilst having limited capacity to respond.

### The Interpersonal Level: The Influence of Your Work on Work/Private Life of Others, and the Influence of Others’ Work on Your Work/Private Life

We now turn to the possible impact of unclear organizational boundaries and expectations upon the interpersonal level. How does work influence one’s private life during COVID-19? And when several people are working from the same household, and several organizations are represented in the same home, how does one person’s work influence the private life of others?

The consequence of working from home might differ between individuals. Kossek (2016) identifies 3 different styles that people adopt for dealing with work-life boundaries in a digital age. The styles represent different ways of dealing with 5 trends of modern work life: that work and non-work roles are increasingly blurred and overlapping (i.e., “boundarylessness”); that people are increasingly forced to work non-standard and specialized



hours (“work-life customization”); the lack of control over when one is “on” vs. “off” work (“psychological control over working time”); an increase in interruptions between work and private life (“work—life fragmentation”); and the fact that people have multiple social identities (“diversity and inclusion”).

During COVID-19, people previously not working from home have now been forced to do so. This may impact various job demands and expectations about being “virtually present” at different hours than before. Thus, COVID-19 is likely to impact several of the 5 trends identified by Kossek (2016): in particular boundarylessness, work-life customization, psychological control over working time, and work-life fragmentation.

The 3 “work-life boundary management styles” identified by Kossek (2016) are integrator, separator, and cyler. An *integrator* is someone who has frequent work to non-work interruption behaviors and/or frequent non-work to work interruptions, either because this is their preference (“fusion lover”) or because they feel they have no other choice (“reactor”). A *separator* has a low frequency of both work-to-non-work and non-work-to-work interruptions, either by conscious choice (“divider”), or because the nature of the workplace prevents such interruptions (“captive”). A *cyler* is someone who periodically, be it weekly or seasonally, separates between work and non-work, and at other times integrates the two.

Based on these distinctions, one might predict that working from home would be less stressful for integrators or cyclers, but more stressful and difficult for separators. Moreover, the extent to which one’s private life is influenced by other household members’ work might depend on the other person’s management style, as well as the degree of correspondence between one’s own and the other person’s work-life boundary management styles.

### Suggestion 3: Norm Conflicts Are Enhanced by Digitalization

So far, we have addressed and exemplified the types of norm re-negotiations taking place during COVID-19 (Suggestion 1), and how the stress associated with such re-negotiations may be enhanced due to the diffusion of the demarcation among various professional arenas and the private sphere (Suggestion 2). We now turn to the role of *digitalization*. In our view, the role of digital communication has the potential of enhancing norm conflicts and ambiguity. During COVID-19, digital communication is common when working from home. Obviously, the following arguments apply to the COVID-19 telecommuters. However, because digital communication has the same benefits and limitations regardless of geographical distance between different parties, the following arguments apply beyond the mitigation-efforts of COVID-19: to anyone communicating digitally, such as everyday telecommuters or members of a virtual team.

#### The Level of Work Tasks: The Impact of Digitalization on Norm Conflicts Related to Work Tasks

It is difficult to give general descriptions of how increased digitalization influences people’s work tasks. This would depend on a broad variety of factors, including the nature of the work, the degree of active collaborations, and the degree of autonomy. Here

we mainly discuss how increased digitalization could enhance norm conflicts related to work tasks.

When previously “off-line” tasks suddenly have to be conducted online/digitally, the workload of that task could change. Certain things become easier and less time-consuming with digitalization, others harder and more time-consuming. For instance, online meetings can sometimes be more efficient than face-to-face meetings. In contrast, follow-up on the work of individual pupils in a school class can be more time-consuming than the same follow-up in a classroom. At a more general level, digital teaching could benefit some children and disadvantage others.

Digitalization could also change interactions and division of labor in the workplace. Signals may be sent out, with people *ghosting* you, that is overlooking messages, posts and requests. Ghosting is far easier in the virtual context than face to face. Personal ability to explicitly ask or even demand help may not be enough to counter lack of resources in form of clear roles (cf. Xanthopoulou et al., 2009). However, with clear organizational support, such personal resources may mediate into efficient team work.

Certain professions face particular concerns during COVID-19. For example, counselors and therapists conducting confidential conversations with clients that now have to be conducted using online meeting platforms. Similarly, leaders having meetings about sensitive topics online. Although digital tools may have advantages also in these types of situations, e.g., because of efficiency or logistics, they also come with some risks and ethical concerns.

A fundamental challenge is how to best interact with and deal with larger groups. The one-on-one conversation may be quite easily replaced. Group processes, however, often need more preparation, a high grasp of technical demands and resources, and a well-adapted pedagogical process.

#### The Level of Leadership/Organization: The Impact of Digitalization on Leadership Distance

##### *Automated Leadership*

Digitalization in general is full of automated functions, defining tasks, times, sending reminders, insisting on follow-up, and so on. This is true also of digital resources in work-at-home conditions. We are accordingly convinced that automated functions vastly *increase interaction frequency*. Various gadgets can go “ping” in your pocket at virtually any time. The *physical distance is accordingly vastly reduced* for the automated leadership. The automated boss becomes more present, perhaps even looming, and unrelentingly so (cf. Dzieza, 2020). It is however an open question whether the automated boss can be considered socially close (cf. Antonakis and Atwater, 2002). Our suspicion is that the inhuman faceless quality of most *automated systems is more akin to an extremely socially distant lord*, than an empathic team leader. The automated leadership will potentially make greater relative impact amongst white collar workers during the COVID-19 changes, in a fashion previously experienced mainly by blue collar workers (cf. Dzieza, 2020). There are clear parallels to the scientific management/Taylorism in the early 1900-hundreds. The image of the conveyor belt

literally swallowing the Tramp in Chaplin's "Modern Times" springs to mind. In light of the COVID-19 crisis, we note that such mechanistic organizational models are "designed to achieve predetermined goals ... have difficulty in adapting to change ... [and] are *not* designed for innovation (Morgan, 1998, p. 32)."

### **Human Leader Through Digital Interface**

The human leader is likely to be more physically distant in the work-at-home condition. Here the digital interface may reduce this distance, for better and for worse. For the better through possible personal contact. For worse, by unprecedented invasion of the private sphere. Interaction frequency may both increase and decrease. Many interactions could be experienced as part of the automated leadership. The digitalization influence on social distance is perhaps the most difficult to predict in terms of directionality. Digitalization may likely act as a catalyst. That is, dependent on how leaders, formal or informal, use the digital resources. What the subordinate needs and expects is likely important to begin with. The leader could use the digital resources to increase or decrease social distance. Dependent on whether this does match or mismatch the needs of the subordinate, it could lead to either a desirable or an undesirable change in social distance. Accordingly, the leader may be experienced as both active or passive, as both constructive or destructive in this regard. If the subordinate acts with mismatching OCB or with CWB, the leader may through the digital interface be less able to appropriately and constructively remedy the situation.

### **The Interpersonal Level: Proper vs. Improper Behavior in Online Work Environments** *Empirical Value of Clear Norms in Online Work Environments*

Gajendran et al. (2015) found that telecommuting in general lead to higher perceived autonomy and was positively related to various outcome measures. This study was conducted some years ago, and in a setting where telecommuting was less common. For the purpose of our paper, the most important finding is that normative appropriateness of telecommuting was a central mediating variable. An important implication for the COVID-19 situation is that the norms of telecommuting matter. With the overarching changes of norms we argue in the wake of COVID-19, also veteran telecommuters may experience drops in performance and autonomy. It may for instance be more motivating to feel special, almost unique, in using these resources. When everybody does it, then there is a need to find other ways to increase workers' felt autonomy and motivation.

### **Matching the (Machine) Management Expectations**

Elsbach et al. (2010) showed how *passive face time* has increased the view of subordinates as good employees, eligible for pay raises and promotions. It is not clear whether this also happens during and after the COVID-19 distance work. Is it still as proper for coworkers to hang around digitally and just showing their faces? Or will actual results weigh more? Face time as a proxy for organizational commitment may increase gender inequality (Stamarski and Son Hing, 2015), and would matter

for caretakers of children. Now, strategies for appropriate subordinate appearances, may even with telecommuting include literal passive face time. An example is attending video meetings without contributing substantially. Yet, coworkers may struggle for new alternatives, such as inserting empty meetings into the digital calendar. All such struggles should be taxing. Initial performance increases may simply be reflective of initial absence of skills in digitally displaying passive face time. Furthermore, should subordinates fail to figure out new strategies, they may well experience the Tayloristic effects described by Dzieza (2020): "To satisfy the machine, workers felt they were forced to become machines themselves." Thus, worker strategies in these new telecommuting conditions may indeed be interpreted as inefficient shirking, but also as strategies rewarded with career advantages (cf. Elsbach et al., 2010), and strategies to preserve humanity and health (cf. Dzieza), and to preserve or gain professional control of work tasks (cf. Abbott, 1988). It is also conceivable that subordinate behavior seemingly at odds with the machine or management definition of efficiency may be expressions of valuable emerging *shared mental models* of crisis solutions: Carrington et al. (2019) reported empirical findings that shared mental models during prolonged crises tended to emerge bottom-up, rather than top-down from management.

We have thus outlined a number of functional explanations of subordinate behavior which may fail to match the expectations of the automated or human management systems. Curiosity and cautious interpretation among managers and researchers seem called for.

### **Matching Interpersonal Expectations**

Interpersonal proper behavior may be more ambiguous for most people new to the virtual environment (cf. Arvedsen and Hassert, 2020). Many cues are different than in real life: When to speak, when not to, when to raise your voice in affect, when not to. Particularly cues for "reading the room," including pheromones or peripheral vision or small sounds may be heavily reduced or even absent. When relative power may be changed, for instance by new formal or informal leaders emerging, and old leaders receding into the background the potential for mismatched sweet spots will likely increase (cf. Kant and Norman, 2019).

### **Examples of Specific Testable Propositions Derived From Our Suggestions**

It is now time to give a few examples of specific propositions that can be derived from the above suggestions in combination. The suggestions in turn rest upon the selected four sets of theory.

Our aim is not to give an overview of every proposition possible to derive from combining our suggestions. Instead, we will exemplify two possible propositions, each relating to some of the suggestions outlined in *The COVID-19 Situation Leads to a Massive Re-negotiation of Norms Related to Work, The COVID-19 Situation Diffuses the Demarcation Between the Various Professional Arenas and the Private Sphere, and This Diffusion Enhances the Stress Associated With Norm Conflicts, Norm Conflicts Are Enhanced by Digitalization*.

The following propositions aim to show the practical applicability of our arguments. Researchers may be able to

generate many other propositions based on the rationales of our suggestions. Propositions could be used as a basis for testable hypotheses and study designs. In addition, they could be used by leaders and other practitioners to inform day-to-day decisions, when they find themselves in notable changes, such as the ongoing pandemic. We attempted propositions that specify under which conditions certain of our theoretical suggestions are likely to emerge (Sutton and Staw, 1995).

Before testing any of the propositions, one needs to be aware of the importance of timing, as also highlighted by Sutton and Staw (1995). For both researchers and practitioners, the timelines presented in **Figure 2** can be used to inform decisions on which questions to ask and which outcomes to expect, at different points in time. It can be used to indicate at which stage the crisis may have a confounding influence on other measures. For instance, in high intensity phases, through a higher likelihood of emotional responses such as irritation, anxiety, and fear; through lower psychological safety in their team at work (Edmondson, 1999); through higher role ambiguity and role conflict; or through lower identification with the organization.

### Proposition 1

*Automated leadership is more likely to be experienced as negative during intense norm re-negotiation phases (cf. Norm Conflicts Are Enhanced by Digitalization, cf. Figure 2). Therefore, each single leadership action will have an increased risk of being experienced as malign.*

By automated functions we do not mean technology itself, but functions in the organization, in software and other digital systems which may be experienced as leadership functions (cf. The Level of Leadership/Organization: The Impact of Digitalization on Leadership Distance). Rather than being perceived as job resources or tools for workers controlling work tasks such exposure to automated leadership will be experienced either as reduced job resources or increased job demands.

Rationale for this proposition can be found in our theorizing above. The likelihood of automated leadership being experienced as negative will increase with: intensity of renegotiation of norms in certain phases (**Figure 2**); signals invading the private sphere of the worker, or the private sphere of innocent third party household members (cf. The Interpersonal Level: The Influence of Your Work on Work/Private Life of Others, and the Influence of Others' Work on Your Work/Private Life); the close distance effect of high frequency of interaction (cf. The Level of Leadership/Organization: The Impact of Digitalization on Leadership Distance); signals carrying little face value of importance to the worker (cf. The Level of Work Tasks: Norm Conflicts Relating to What Is the "True Essence" and Prioritized Tasks of One's Job); reducing the workers' control of work tasks [cf. The Level of Work tasks: The Continuous Influence of Societal Changes on Work Conditions and Work Tasks (and Private Tasks)] or job resources in comparison with job demands (cf. The Level of Leadership/Organization: Norm Conflicts Relating to Who or What Has Oversight, Surveillance, and Sanctioning Rights).

Leaders or practitioners considering the proposition in an ongoing crisis, may just like researchers want to keep track of

and measure the phenomenon. Considering their responsibility of caring for both the survival of their organization and their employees, they may want to:

(a) Reduce automated leadership to a minimum, particularly functions with limited proven benefit to the organization and high likelihood to encumber the workers. In this, they should take pains to protect the workers private sphere. (b) Strictly prioritize critical tasks, and to communicate clearly around these. Communication and discussion on the topic of what the current norms for desirable and undesirable behavior are should be done on a regular basis. (c) Show empathy and concern for the real threats workers likely discern on the horizon. This would reduce unnecessary resistance against organizational change (Oreg, 2006) by building trust, but above all display a uniquely warm and beneficial aspect of human leadership countering the detriments of automated leadership we hypothesize.

### Proposition 2

*Organizations which take pains to proactively deal with the intense norm re-negotiation phases and associated issues will fare better than organizations which do not take such pains. Organizational outcomes may include, but not be limited to: organizational survival, increased profit or other results, increased market shares, increased reputation; increased innovation; lower turnover; increased trust in management; lower sick-leave; increased identification with the organization; increased psychological safety; increased team cohesion; increased leader-member exchange; increased role clarity; decreased role conflict; lower reports of destructive leadership; higher reports of constructive leadership.*

Rationale for this proposition can be found in our theorizing above. Ways in which organizations can deal with norm negotiations may include: timely efforts to parry both escalation and de-escalation phases (cf. The COVID-19 Situation Leads to a Massive Re-negotiation of Norms Related to Work; **Figure 2**); efforts aimed at acknowledging threats and stressors experienced by workers; efforts aimed at fair and explicit re-negotiation of norms (cf. The COVID-19 Situation Leads to a Massive Re-negotiation of Norms Related to Work); minimization of low priority stressors (cf. The Level of Work Tasks: Norm Conflicts Relating to What Is the "True Essence" and Prioritized Tasks of One's Job); minimization of non-critical automated leadership (cf. The Level of Leadership/Organization: The Impact of Digitalization on Leadership Distance); maximization of low distance human leadership supporting workers (cf. The Level of Leadership/Organization: The Impact of Digitalization on Leadership Distance); minimization of signals invasive of the private sphere (cf. The Interpersonal Level: The Influence of Your Work on Work/Private Life of Others, and the Influence of Others' Work on Your Work/Private Life).

Leaders or practitioners considering the proposition in an ongoing crisis, may just like researchers want to keep track of and measure the phenomenon. Considering their responsibility of caring for both the survival of their organization and their employees, they may want to: use best practice in general crisis management (e.g., Lunde, 2014)—specifically to use mental time travel (Nyberg et al., 2010) anticipating the high

intensity phases of norm re-negotiation. Then to let this guide preparatory focused and prioritized efforts in line with the previous paragraph. Above all—passivity is not an option!

## CONCLUDING REMARKS

The COVID-19 pandemic poses great uncertainty. There are uncertainties about the duration and extent of the pandemic, and of the preventive and mitigative measures. We have argued that the COVID-19 pandemic and its associated crisis trajectories represent a context of massive re-negotiation of norms in a number of arenas. Due to the uncertain nature of COVID-19, the re-negotiation of social norms may appear correspondingly fleeting. People will wonder how long they will have to be working from home, whether the new norms will be carried into the future, and/or whether these will dissolve when life returns to normal. We have discussed possible implications of this impermanence.

This paper provides explanations of ongoing, urgent issues causing substantial changes in the norms of working life. This allows for the general predictions we have provided in our three main suggestions, with subsequent more specific suggestions. Using these will allow researchers to easily build yet more specific propositions, which we have given two examples of. Further theoretical development and empirical testing may be done on this foundation.

The individual theories from which our suggestions are derived, are well-established and empirically supported. Our contribution is to clarify where the selected theories have connections, and how they together may hold even greater explanatory value than alone. We expect the phenomena we describe to have distinct effects. Our suggestions connect to well-documented general advantages, for instance creating role clarity, psychological safety, and resolving jurisdictional contests. Therefore, they could be applied by leaders who are facing norm negotiations during the intensity-changes of this pandemic or other significant crises (cf. **Figure 2**).

Our analysis is theoretical. Our suggestions and discussion points are derived from applying and combining ideas from 4 different theoretical approaches. Our hope is that our theoretical analysis can be used as a framework for understanding how people's work conditions are affected by COVID-19. The suggestions derived from our theoretical analysis can also be used as a starting point for empirical studies. A limitation related to the choice of a theoretical genre, is that we could have applied other theories, provided other examples and looked at other levels of analysis.

A number of factors may modify the renegotiation of social norms, many of which have not been discussed here. These include *culture* (e.g., tight and loose; Gelfand et al., 2011), social distance (Kant and Norman, 2019), and leadership distance (Antonakis and Atwater, 2002). In the current situation, the most obvious modifying factor is *digitalization*. With social distancing measures, work-related communication largely occurs digitally. The situation also opens for leaders controlling/surveilling their

workers by digital means. We therefore also address some concerns arising from the fact that for most telecommuters, relevant interactions relating to social norm re-negotiation during COVID-19 take place *in digital worlds* and *simultaneously* in people's homes. We suggest that re-negotiation of norms in the COVID-19 situation may be influenced by norm conflicts caused or enhanced by so-called "disrespectful technologies" (Diefenbach and Ullrich, 2019).

Even though this paper specifically addresses stressors for people currently employed, it is important to acknowledge the stress, uncertainty, and economical difficulties that now face those unemployed as a result of COVID-19. Our investigation centers around those who relatively speaking are fortunate during the COVID-19 pandemic. The challenges we address are about processes demanding change, adjustment and renegotiation; in confined spaces; where the demands of many organizational bodies meet. In the paper, we have gone into depth about each of our theoretical suggestions, provided illustrative examples and provided interpretation of relevant data. Our aim is to contribute to existing theory, including theory on negotiation of norms, professions, digitalization, and benign violations. Because we point to potential risk factors of psychological distress, our analysis also has long term applied value for clinical and organizational psychology. It is our hope that our analysis also is of value, as nearly half of the world in June 2020 craves to understand how to deal with the dilemmas we have described.

## AUTHOR CONTRIBUTIONS

LK conceived of the presented idea and had the main responsibility for developing the theoretical arguments in line with existing literature. LK also had the main responsibility for writing up the paper. EN provided input into the organization of arguments, took part in discussions, and contributed to the write-up. Both authors contributed to the article and approved the submitted version.

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# The Implementation of Patient-Centered Humanistic Care for COVID-19 Closely Contacted Hemodialysis Patients Under the Hospital-Based Group Medical Quarantine: A Brief Research Report

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In February 2020, an inpatient in Peking University People's Hospital (PKUPH), China, was confirmed positive for the novel coronavirus. In this case, 143 hemodialysis patients were labeled as close contacts and required to be placed under the hospital-based group medical quarantine (HB-GMQ) for 2 weeks by the authorities. After the case was reported, false or misleading information about the case flourished on social media platforms, which led to infodemic. Under this context, PKUPH adopted patient-centered humanistic care to implement the HB-GMQ, through the synergy of administrative, healthcare, logistical, and other measures under the model of patient-centered care of the Massachusetts Medical Society (MMS). As a result, all the patients tided over the HB-GMQ with no COVID-19 infection and no unanticipated adverse events, and all met the criteria for lifting the HB-GMQ. According to the questionnaires taken during the HB-GMQ, a high level of satisfaction was found among the quarantined and no symptomatic increase of anxiety and depression in the patients before and during the HB-GMQ, by comparing the Zung self-rating anxiety scale (SAS) and self-rating depression scale (SDS) conducted in December 2019 and on the 12th day of the HB-GMQ. This article is to brief on PKUPH's experience in implementing patient-centered humanistic care tailored to hemodialysis patients under the HB-GMQ, and to validate the hypothesis that patient-centered humanistic care is effective and helpful to help them tide over the HB-GMQ, so as to shed light on how to implement the HB-GMQ and cope with the HB-GMQ-induced problems in other hospitals.

**Keywords:** humanistic care, measures, COVID-19, hospital-based group medical quarantine, hemodialysis patients

## INTRODUCTION

Humanism in medicine is fundamental to excellent patient care (Chou et al., 2014), which is an aspect imperative to quality healthcare (Muneeb et al., 2017). Generally, humanistic care is referred to as a patient-centered approach emphasizing a positive and trusting relationship between the caregiver and a patient, characterized by collaboration, dignity, empathy, and trust. In 1988, the Picker Institute in Britain coined the term “patient-centered care” to call attention to the need for healthcare practitioners and systems to provide care not only from a clinical perspective, but also from the patient and family perspective (Gerteis et al., 1993). In 2001, the Institute of Medicine defined patient-centered care as “providing care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions” (Institute of Medicine Committee on Quality of Health Care in America., 2001). In this sense, when patient-centered approach and attitude are adopted, patients are partners with healthcare practitioners who will focus more on emotional, mental, spiritual, social, and financial needs of patients, rather than just on their clinical needs. And patient-centered care can be achieved by devoting visit time to non-medical aspects of the life of the patients, maximizing quality face-to-face time in patient interaction, empathizing with the patient, and involving the patients in decisions about their care (Draeger and Stern, 2014).

A large body of research supports the hypothesis that patient-centered humanistic care is fundamental to excellent patient care. Everhart et al. (2019) believed that “patient-centered care and patient- and family-centered care (PFCC) improve patient and family satisfaction, patient self-management, and physical and mental health outcomes.” Delaney (2017) reiterated the benefits of humanistic medical care and stressed that the patient-centered approach, as a primary approach to healthcare, can enhance healthcare, and patient satisfaction.

The outbreak of the novel coronavirus, which began in 2019, has become a global pandemic and posed a significant threat to global health. To resist the spread of the virus, quarantine and isolation are deemed as critical measures that have been put in place across the globe. On February 18, 2020, an inpatient in Peking University People’s Hospital (PKUPH) was confirmed positive for the novel coronavirus, leading to hospital-based group medical quarantine (HB-GMQ) of 143 hemodialysis patients for 2 weeks.

Unlike putting healthy people under the HB-GMQ, it was challenging for PKUPH to take care of vulnerable hemodialysis patients in terms of healthcare, psychology, dietary, etc. First, most hemodialysis patients are elderly people who have more or less psychological disorders, underlying diseases, and comorbid conditions; delicate care and emergency preparedness should always be considered in the workplace for any unexpected event. Second, hemodialysis patients are subjected to unusual emotional stress and have a wide variety of psychological problems (Levy, 1979). All hemodialysis patients were in a state of distress and worried about the possibility of infection. Third, quarantine might have further aggravated their preexisted psychological

problems, as it often comes with distressing side effects, including post-traumatic stress disorder (PTSD). Fourth, following a kidney-friendly diet further increased the difficulty of providing care to these patients, as dietary requirements differ from patient to patient depending on the state of the condition. Faced with all these challenges, PKUPH, in adherence to COVID-19 protocols and recommendations and advice for the healthcare settings and public by the World Health Organization (WHO) (2020) and the Chinese health authorities, adopted a patient-centered humanistic approach and attitude to implement the HB-GMQ under the model of patient-centered care of the Massachusetts Medical Society (MMS).

Although the outbreak of infectious diseases such as SARS, MERS, EBOLA, and COVID-19 stimulated related research, there still remains little research on the psychological impact on hemodialysis patients and how to implement the HB-GMQ for those who are directly exposed to infectious diseases. Therefore, the purpose of this study was to validate the hypothesis that patient-centered humanistic care is effective in reducing anxieties or depression in hemodialysis patients, increasing their satisfaction and compliance with the HB-GMQ.

## METHODS

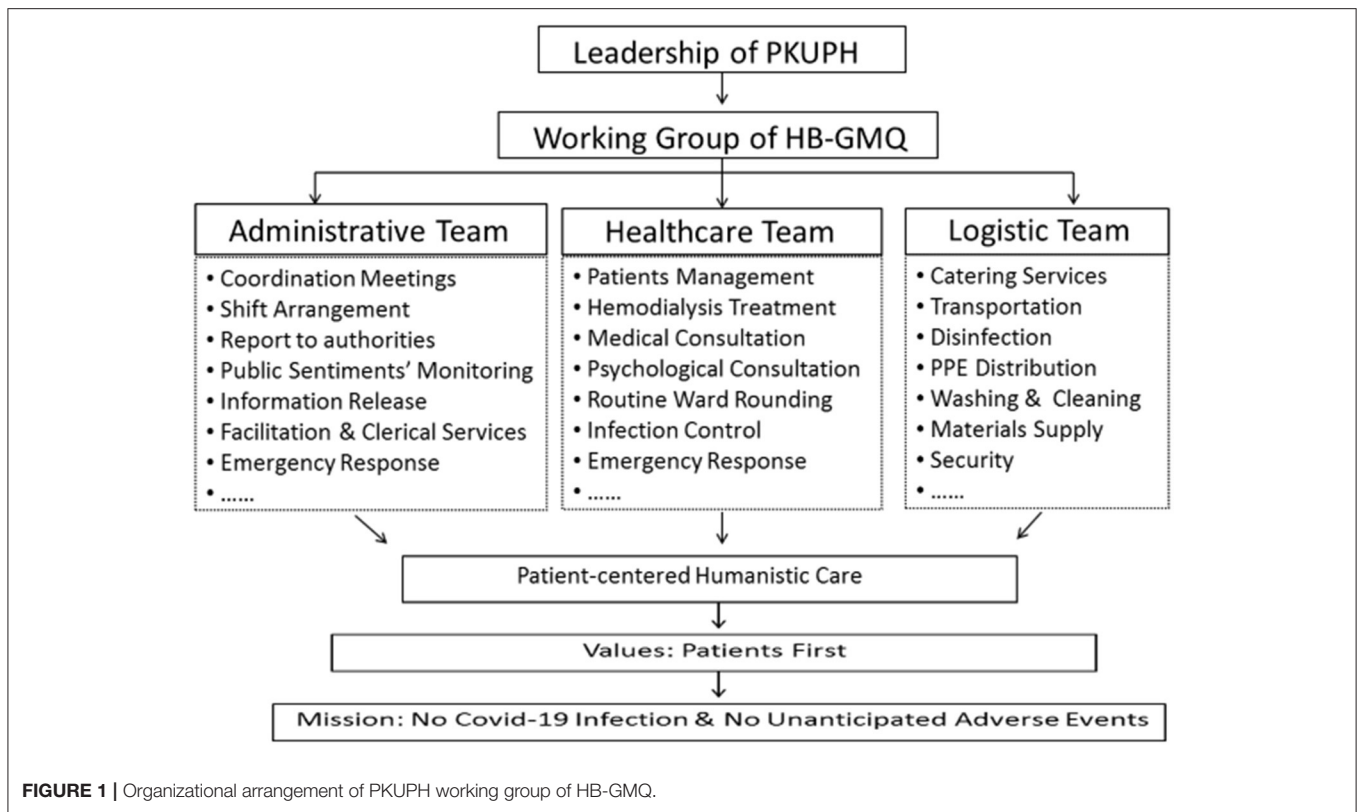
### Setting and Sample

After the case was reported, 143 hemodialysis patients were labeled as close contacts and required to be quarantined by the authorities. PKUPH, under the guidance of the governments at different levels, immediately set up a working group to manage the HB-GMQ and adopted patient-centered humanistic care approach to help these patients safely tide over the quarantine. The study was performed on a designated campus called Baitasi Campus for a 14-day period since the quarantine had been imposed on February 18, 2020. The inclusion criteria were as follows: (1) regular hemodialysis  $\geq 3$  months; (2) under the HB-GMQ; and (3) informed consent and signed informed consent form. The exclusion criteria were as follows: (1) acute blood loss or acute infection within 3 months; (2) cardiovascular and cerebrovascular accidents, rheumatic immune diseases, or uncontrolled malignant tumors occurred within 3 months; (3) people with mental illness; and (4) people with severe cognitive impairment. And the withdrawal criteria were as follows: (1) patients who failed to complete the HB-QMG and (2) withdrawal from the study upon the request of subjects.

Before the quarantine, the nucleic acid amplification test (NAAT) was given to the close contacts and the results were all negative. During the quarantine, the patients received maintenance hemodialysis as they did in the past. After 14 days, patients with no clinical symptoms of COVID-19 and no severe health conditions could be discharged.

At the initial phase of the HB-GMQ, the demographic characteristics of conditions of the patients were sorted out from medical records. With the information, medical staff could make informed decisions, pay special attention to those with severe conditions, provide expert medical consultations, and render individualized care accordingly.





## Patient-Centered Humanistic Care Provided by PKUPH During HB-GMQ

Leaving a familiar and comfortable home environment for the HB-GMQ would be difficult for the most hemodialysis patients. The call for the HB-GMQ would result in anxieties or distress on the patients, which in turn would project undesirable emotions onto someone else and hamper the implementation of the HB-GMQ. Initially, two patients in this case were unwilling to be quarantined for one reason or another. Persuaded by the communities and the local governments, they finally accepted the HB-GMQ. In order to stabilize the emotions of the patients, prevent their symptomatic increase of anxiety and depression, avoid their misunderstandings toward quarantine arrangements, and help them smoothly tide over this special period, PKUPH formed a working group and incorporated patient-centered humanistic care into the day-to-day routine management, healthcare, and logistics, trying its best to provide convenience as much of the home environment as possible. During the HB-GMQ, the working group put patients first as the core values and aimed to achieve the objectives of “no COVID-19 infection and no unanticipated adverse events.”

A working group led by two vice presidents of PKUPH was soon established after the case was confirmed. Heads from different executive departments and medical specialists from different fields of practice were mobilized to establish a coordination mechanism (Figure 1). In accordance with COVID-19 protocols and guidelines of the WHO and Chinese

health authorities, PKUPH provided patient-centered care under the model of patient-centered care of the MMS, which is presented in Table 1.

## Instruments

During the HB-GMQ, PKUPH practiced patient-centered humanistic care through the synergy of administrative, medical, logistical, and other specific measures under the model of patient-centered care of the MMS. The model of patient-centered care of the MMS involves seven indicators: (1) mission and values aligned with patient goals; (2) full transparency and fast delivery of information; (3) care is collaborative, coordinated, accessible; (4) family welcome in care setting; (5) psychological comfort and emotional well-being are top priorities; (6) patient and family always included in decisions; (7) patient and family viewpoints respected and valued. The PKUPH's patient-centered humanistic care under the model of patient-centered care of the MMS is presented in “Patient-centered Humanistic Care Provided by PKUPH during HB-GMQ” section.

In order to assess the effectiveness of the PKUPH's approach of patient-centered humanistic care, electronic satisfaction questionnaires were administered by nurses in charge to 143 hemodialysis patients to fill out on the 14th day of the HB-GMQ, and the differences in hemodialysis patients' anxious or depressive symptomatology before and during the HB-GMQ were recorded by the Zung self-rating anxiety scale (SAS) and self-rating depression scale (SDS) conducted in December 2019 and on the 12th day of the HB-GMQ.

**TABLE 1** | PKUPH's patient-centered humanistic care under the model of MMS.

Indicators under the model of patient-centered care of the MMS	PKUPH's approach
Mission and values aligned with patient goals Care is collaborative, coordinated, accessible	PKUPH put the quarantined hemodialysis patients first, with the mission of “no COVID-19 infection and no unanticipated adverse events during the HB-GMQ.” During the HB-GMQ, routine dialysis treatment, expert medical consultations, and routine ward rounds were provided. Nephrologists and nurses were available 24 h, and a multidisciplinary team composed of specialists from different fields of practice was established to meet and respond to the healthcare needs of the patients during the HB-GMQ. Moreover, relatively fixed positioning of medical staff was arranged in the hope that all medical staff can grasp all the information and the characteristics of each patient to avoid poor information sharing due to handovers.
Psychological comfort and emotional well-being are top priorities	Nephrologists and nurses at PKUPH were required to pay attention to the physical and mental well-being of the patients during rounding, and render timely psychological counseling and emotional support according to patient-specific symptoms and psychological survey scale. Second, PKUPH provided health education about the coronavirus for the quarantined during the HB-GMQ aiming to increase their awareness of prevention and relieve their worries about the virus. Third, nephrologists and nurses at PKUPH increased the frequency of daily visit and created a group chat on social network APP to collect the claims of the patients and timely responding to their requests, such that strengthened the communication between the patients and improved the patients-medical staff relations. Fourth, to follow a renal diet, the catering staff tried every means to come up with a diet that was tailored to the needs of the patients, and met their individualized diet needs under the guidance of nephrologists and nutritionists. Fifth, the working group connected with local authorities to solve the issuing of the quarantine pass, formulate return-to-community plan, and tackle the problem of community inaccessibility.
Family welcome in care setting	Each patient was allowed to bring a family member to live with them during the HB-GMQ. Their family members were not allowed to visit home and return back to the hospital during the HB-GMQ period.
Patient and family always included in decisions	Treatments and therapies were provided based on the discussions with the patients and family.
Patient and family viewpoints respected and valued	Respected and valued the patients and their family's decisions and collaborated to facilitate the HB-GMQ-induced problems.



NEJM (2020). NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society.

The left column of this table explains the model of patient-centered care of the MMS, and the middle column of this table describes PKUPH's approach under the model of patient-centered care of the MMS. The picture in the right column of this table shows a 72-year-old hemodialysis patient bowed to the working staff to show his gratitude to the care he received during the HB-GMQ. Photographed by Lian Zu (Health News, 2020).

The patient satisfaction survey investigated seven aspects of satisfaction: (1) hospital meals, (2) living environment, (3) dialysis treatment, (4) transfer services, (5) hospital hygiene, (6) material supply, and (7) overall experience of the HB-GMQ. The level of satisfaction was divided into five categories: very satisfactory, satisfactory, ordinary, unsatisfactory, and very unsatisfactory. To avoid potential source of bias, data of “unsatisfactory” and “very unsatisfactory” were also recorded in the study. The detailed information is presented in the “Result” section.

The Zung SAS and SDS are methods of measuring levels of anxiety and depression in patients who have anxiety-related and depression-related symptoms. Both are self-administered surveys with 20 questions on the scale. Under the SAS and SDS, each response was scored on a scale of 1–4 (none or a little of the time, some of the time, a good part of the time, most or all of the time). Under the SAS, the authors divided the rough score by 80 to get the anxiety severity index scores, which range from 0.25 to 1.00, with 0.50–0.59 in Mild Anxiety Levels; 0.60–0.69 in Moderate to Severe Anxiety Levels; 0.70 and above in Severe Anxiety Levels. Under the SDS, the authors divided the rough score by 80 to get the depression severity index scores, which

range from 0.25 to 1.00, with 0.50–0.59 in Mildly Depressed; 0.60–0.69 in Moderately to Severely Depressed; 0.70; and above in Severely Depressed (Wu, 2015).

## Procedures

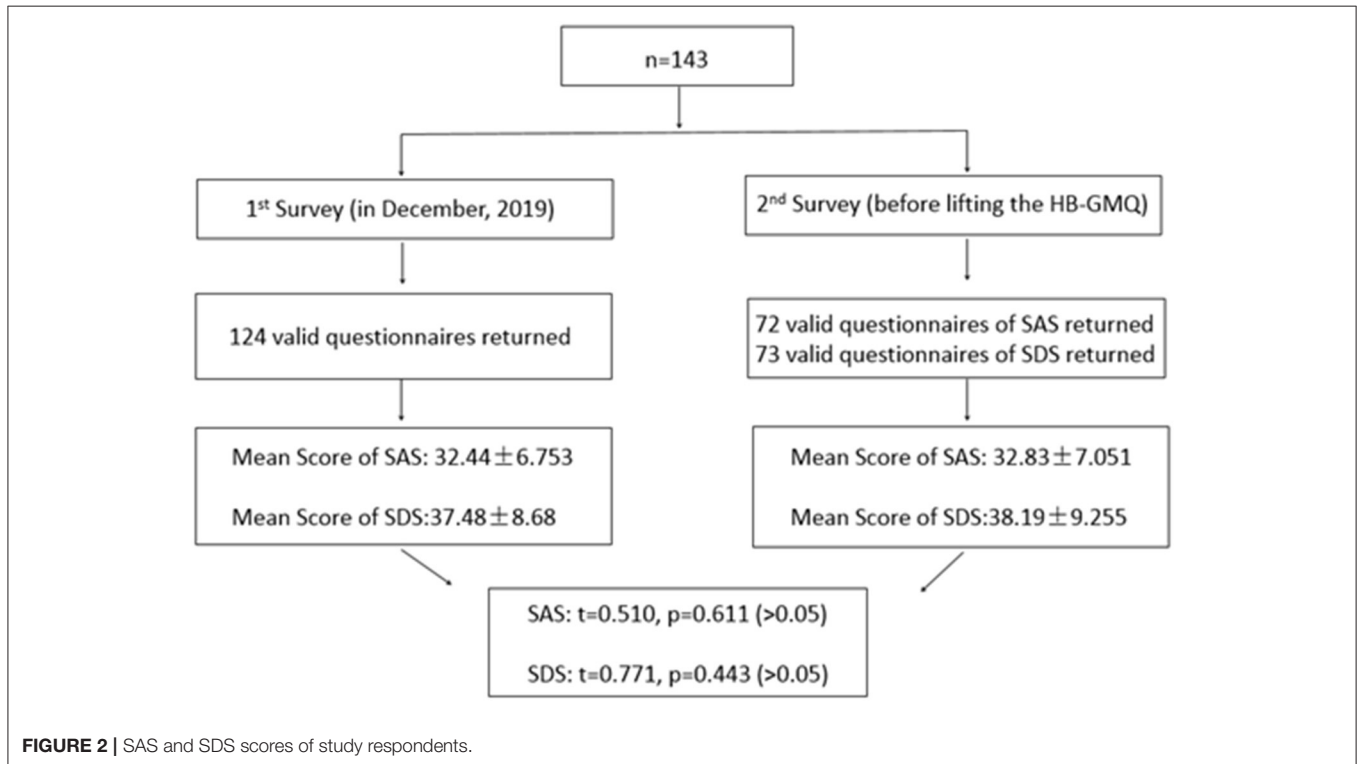
The best way of measuring whether the practice was patient-centered or not lies in the assessment made by the patients themselves. To evaluate the effectiveness of the implementation of patient-centered humanistic care practiced by PKUPH during the HB-GMQ, satisfaction questionnaires were administered to 143 hemodialysis patients on the 14th day of the HB-GMQ by nurses in charge (Table 2).

At the Hemodialysis Center of PKUPH, it is a routine job for nurses to collect the patients' data of SAS and SDS on a regular basis to evaluate the level of anxiety and depression. To compare the differences in the anxious or depressive symptomatology of the patients before and during the HB-GMQ, the data of SAS and SDS that were obtained in December 2019 were used to compare with the data that were collected on the 12th day of the HB-GMQ in 2020 (Figure 2).

All the above-mentioned procedures were conducted after the patients signed the consent form. And those who were involved

**TABLE 2** | Data of patient satisfaction questionnaire.

Satisfaction survey questions	Very satisfactory	Satisfactory	Ordinary	Unsatisfactory	Very unsatisfactory
Are you satisfied with the hospital's meals?	28 (21.54%)	48 (36.92%)	39 (30%)	9 (6.92%)	6 (4.62%)
Are you satisfied with the room you are in?	32 (24.62%)	59 (45.38%)	28 (21.54%)	8 (6.15%)	3 (2.31%)
Are you satisfied with the dialysis treatment process?	84 (64.62%)	45 (34.62%)	1 (0.77%)	0	0
Are you satisfied with the hygiene of the hospital?	56 (43.08%)	59 (45.38%)	10 (7.69%)	4 (3.08%)	1 (0.77%)
Are you satisfied with the transfer services during the dialysis process?	70 (53.85%)	52 (40%)	4 (3.08%)	2 (1.54%)	2 (1.54)
Are you satisfied with material supply of the hospital?	60 (46.15%)	65 (50%)	4 (3.08%)	0	1 (0.77%)
Your overall satisfaction with the care during GMQ period?	51 (39.23%)	64 (49.23%)	10 (7.69%)	2 (1.54%)	3 (2.31%)



in the data collection of SAS and SDS in December 2019 provided written consent to join the study during the HB-GMQ in 2020. For those who were not convenient to fill out the questionnaires during maintenance dialysis, the nurses in charge shall help them fill out the questionnaires.

### Statistical Analyses

In the analysis of the satisfaction survey, categorical variables were presented as numbers with percentages. In the analyses of SAS and SDS, differences in the anxious or depressive symptomatology of the patients before and during the HB-GMQ were examined by using a paired *t*-test. The statistical significance level was set at 0.05. The hemodialysis management system (Copyright 2006, Beijing Whole Way Technology Co. Ltd) was used for data entry and scoring. Other data were entered into an EXCEL worksheet. The SPSS software package (version 22.0, SPSS Inc., Chicago, IL, United States) was used for statistical analyses.

## RESULTS

### Demographic Characteristics of Participants

A total of 143 hemodialysis patients were enrolled in the study. Of them, 94 are male patients (65.7%), and 49 are female (34.3%). The median age of them was 59.5 years, ranging in age from 30 to 93. The proportion of those over 60 years reaches 53.1%, of which one case is >90 years, 13 cases are 81–90 years, 24 cases are 71–80 years, and 38 cases are 60–70 years.

After combining through the medical records of these 143 hemodialysis patients, at least 75 patients (52.4%) had underlying diseases and comorbidities, 44 patients (35%) had a history of cardiovascular and cerebrovascular diseases, and 22 patients had a history of cancer (15.5%), with cirrhosis in two cases and gastrointestinal ulcer in one case. Twenty-five cases with severe illness were screened out among the 143 patients, and their information was fully shared by the medical

staff. In addition, 24 patients had their relatives accompanied during the HB-GMQ.

### Patient Satisfaction About HB-GMQ

On the 14th day of the HB-GMQ, electronic satisfaction questionnaires were administered to 143 hemodialysis patients, and 130 valid questionnaires were returned. About 99.23% of the respondents agreed that timely solutions were provided when they need help; 96.92% believed that medical staff responded to their questions concerning medical or living needs; 99.23% agreed that the healthcare team assisted them with meal delivery, water fetching, etc. Overall, 115 patients gave very satisfactory or satisfactory (88.46%), 10 patients gave ordinary (7.69%), and five patients gave unsatisfactory (3.85%) (Table 2). Among the unsatisfactory patients, the main reason for “unsatisfactory” was due to the lack of freedom caused by the HB-GMQ.

### Comparison of SAS and SDS Scores Before and During HB-GMQ

In December 2019 (before the HB-GMQ), mental health of 124 cases was effectively assessed by using SAS and SDS, which is a routine job for the Hemodialysis Center of PKUPH. On the 12th day of the HB-GMQ in 2020, SAS and SDS questionnaires were sent to 143 patients. The valid sample size that can be self-paired in the data before and during the HB-GMQ was 72 in SAS and 73 in SDS.

In the study, the authors found that there were no statistically significant differences in anxious or depressive symptomatology of the patients before and during the HB-GMQ by comparing the SAS and SDS scores assessed before the HB-GMQ with those assessed during the HB-GMQ (Figure 2).

## DISCUSSION

Our study showed that a high level of satisfaction about the HB-GMQ was found among hemodialysis patients. This was mainly due to the successful implementation of patient-centered humanistic care for the quarantined. In order to ensure the smooth execution of the HB-GMQ, 32 coordination meetings were organized, 11 medical and nursing regulations and processes were formulated, 2,292 N95 masks and 11,100 surgical masks were consumed, 10,794 sets of meals were offered, and 265 staff members were on site providing services to the quarantined during the HB-GMQ.

During the entire process of the HB-GMQ, patient-centered humanistic care played a crucial role in the successful implementation of the HB-GMQ and in the achievement of the following results: First, patient-centered humanistic care could attenuate negative and reluctant reactions of patients to the HB-GMQ, and gain cooperation and understanding of the patients about the HB-GMQ. Second, patient-centered humanistic care could help build a positive and trusting relationship between the patients and healthcare practitioners during the HB-GMQ. Third, patient-centered humanistic care could alleviate the anxieties or worries of the patients who already suffered from psychological disorders or emotional

instabilities caused by the kidney disease. Fourth, patient-centered humanistic care could increase the compliance of the patients with the HB-GMQ and their satisfaction about the HB-GMQ services. Fifth, patient-centered humanistic care could ensure positive public sentiments toward the outbreak of the pandemic of coronavirus and the HB-GMQ and curb the fearmongering and negative sentiments on social media. Finally, through providing patient-centered humanistic care, the working group had developed growing know-how and insight into addressing key issues related to the management of contagious diseases.

From PKUPH's experience, a sound organizational structure, adequate human and material resources, scientific infection prevention and control, delicate individualized patient care, a complete plan for emergency preparedness, and a multidisciplinary rescue and treatment team constituted the fabric of the HB-GMQ project and determined the final fulfillment of the mission of “no COVID-19 infection and no unanticipated adverse events.”

There is a growing body of evidence showing that most patients undergoing hemodialysis have varying degrees of psychological problems, such as depression and anxiety (Ng et al., 2015). Avdal et al. (2020) also validated that problems of financial losses, social exclusion, stress, fatigue, depression, and anxiety may occur in the patients undergoing hemodialysis and peritoneal dialysis. Besides, the suddenly imposed HB-GMQ might have further aggravated the patients' preexisted psychological problems. Unfamiliar surroundings, misunderstandings toward the HB-GMQ, the fear of the consequences of this infection, and worries over undesirable dietary management in the hospital were all HB-GMQ-induced psychological problems.

Previous studies had revealed that the quarantine did have a psychological impact on patients. During the MERS outbreak, a study conducted by Lee et al. (2018) in the Republic of Korea included 73 hemodialysis patients who were experiencing the hospital-based quarantine. The researchers used the Hospital Anxiety and Depression Scale (HADS) to evaluate the psychological impact of the 2015 MERS on 73 quarantined hemodialysis patients. In the Mini International Neuropsychiatric Interview (MINI), four patients were subjected to major depressive disorder (MDD), and eight patients suffered from generalized anxiety disorder (GAD). In the HADS, eight patients (11%) experienced anxiety, and 11 patients (15.1%) underwent depression (Lee et al., 2018). A recent case of Diamond Princess had also revealed that a 2-week coronavirus quarantine did have a negative psychological impact on the passengers and subjected them to anxiety, depression, and other mental health challenges even after disembarkment (Abrams, 2020). Brooks et al. (2020) illustrated five studies comparing psychological outcomes for people quarantined with those who were not quarantined. The results indicated that a relevant high prevalence of symptoms of psychological distress and disorder was found in those who had been quarantined (Brooks et al., 2020).



In our study, the results showed that no statistically significant differences were found in the anxious or depressive symptomatology of the patients before and during the HB-GMQ. This was probably attributed to the following reasons. First, regular hemodialysis treatment was maintained and provided during the HB-GMQ, which met with some patients' needs for receiving in-patient care and alleviated their worries about the possibility of infection during the commute between their home and the hospital. Second, administrative team, healthcare team, and logistic team were in place to ensure their safety during the HB-GMQ. The administrative team was assigned to do multiple tasks: (1) formulating the generic HB-GMQ plan and emergency plan, ensuring orderly execution of the HB-GMQ plan; (2) coordinating efforts to respond to every emergency; (3) monitoring public sentiments; (4) solving anticipated problems in advance; (5) optimizing management processes and measures; (6) dealing with undesirable emotions and feelings of patients; (7) facilitating personal protective equipment; (8) providing nosocomial infection training; (9) reporting to the authorities; (10) communicating with communities for accessibility, etc. The healthcare team included three subteams, namely, nephrology team, multidisciplinary team and nursing team, who were available 24 h a day to respond to every emergency, and get to know the medical and living needs of the patients and tackle their problems in a quick and appropriate manner. When encountering patients with anxious or depressive symptomatology, the healthcare team would mobilize professionals to provide targeted counseling and therapeutic solutions. In doing so, anxious or depressive symptomatology in the patients could be excluded. The logistic team responded quickly to every arrangement of the generic HB-GMQ plan and formulated the procedures for material acquisition, lift using, infection, cleaning, washing, catering, hospitalization, patient transportation, etc. In order to provide a good environment as much of their home, sanitary, and well-ordered wards were ensured, and high-speed Internet access was guaranteed. After their arrival at the HB-GMQ area, daily necessities, such as toiletries, were purchased and distributed to the patients. To follow a renal diet, the catering staff, under the advice of nephrologists and clinical nutritionists, formulated the dietary plan, and updated the menu every day based on the principles of consuming high-quality protein and limiting fluids, potassium, and calcium. These measures well-exemplified the working staff's efforts in providing patient-centered humanistic care for the quarantined. Third, encouraging and allowing family members to accompany the patients could ameliorate their loneliness during the HB-GMQ. This policy was particularly helpful for older adults who are functionally very dependent on family members. Fourth, expenses of boarding and lodging incurred during the HB-GMQ were completely free of charge for the patients. This practice, to a large extent, had relieved the psychological and economic pressure of the patients and increased that of the level of acceptance of the HB-GMQ.

The main strength of this study is that there is no published research report on the implementation of patient-centered humanistic care for COVID-19 closely contacted hemodialysis patients under the HB-GMQ. As the global COVID-19 pandemic

continues, the study could provide a humanistic approach for overcoming a difficult period considering healthcare arrangement and support.

There are also some limitations to this study. First, the intrinsic feature of patient-centered humanistic care lies in its individualized care. The PKUPH's approach to cope with a COVID-19 situation cannot be fully replicated and reproduced by other institutions. Second, the outbreak of the COVID-19 situation in PKUPH was not foreseeable, the knowledge, and perceptions regarding the COVID-19 at that time were very limited, and the suddenly imposed HB-GMQ was not designed—all of these confined the current study to a limited sample size and the specific group of hemodialysis patients. Third, the results may not fully exhibit the whole picture of the psychological impact of COVID-19 on hemodialysis patients and assess the effectiveness of patient-centered humanistic care under the model of patient-centered care of the MMS.

## CONCLUSION

Throughout the process of the HB-GMQ, the concept and approach of humanistic care under the model of the MMS was highly incorporated into routine management, healthcare, and logistics while adhering to COVID-19 protocols and guidelines of the WHO and Chinese health authorities. PKUPH's experience further validated the hypothesis that patient-centered humanistic care is important in implementing the HB-GMQ and effective in helping the quarantined tide over the HB-GMQ, resulting in a high level of satisfaction about the HB-GMQ, and no symptomatic increase of anxiety and depression in the patients before and during the HB-GMQ. With the concerted efforts from different parties, there have been no unanticipated problems, and no infection cases and no preventable adverse events occurred during the HB-GMQ. According to the patient satisfaction survey, most patients held a positive attitude toward the HB-GMQ with a high level of compliance. At the same time, there was no symptomatic increase of anxiety and depression in the patients by the analyses of the SAS and SDS. It is hoped that PKUPH's experience of implementing patient-centered humanistic care could enlighten other hospitals on how to implement the HB-GMQ and address the HB-GMQ-induced problems.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethical Review Committee of Peking University People's Hospital. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the

publication of any potentially identifiable images or data included in this article.

## AUTHOR CONTRIBUTIONS

HC and JW designed the research. HZ, LG, and XL drafted the manuscript. XS, LZ, JG, XH, XJ, JL, ZH, YW, LW, and

ZG performed the studies. All authors contributed to writing the article.

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# Liaison Psychiatry During the Peak of the Coronavirus Pandemic: A Description of Referrals and Interventions

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**Introduction:** The novel coronavirus SARS-CoV-2 belongs to the coronavirus family, a group of viruses that can cause upper respiratory infections in humans. Among other symptoms, it can present as an asymptomatic infection or as a more severe disease requiring hospitalization. Neuropsychiatric symptoms have been described in the acute phase of the illness and as long-term repercussions. We describe the characteristics and interventions in those COVID-19 patients referred to our liaison psychiatry service.

**Materials and Methods:** This is a cross-sectional descriptive study. This study was carried out within the Department of Psychiatry of Cruces University Hospital (Basque Country, Spain). Data from each psychiatric consultation within our consultation-liaison service were consecutively obtained for 1 month from March 17 to April 17, 2020. We recruited data regarding clinical and referral characteristics and psychiatric interventions.

**Results:** Of a total of 721 SARS-CoV-2 hospitalizations, 43 (5.6%) patients were referred to our psychiatry liaison service. The median age was 61 years old, and 62.8% were women. The infectious disease department was the most frequent petitioner (37.2%), and the most common reason for referral was patient anxiety (25.6%). A total of 67.4% of patients received psychological counseling and 55.8% received some pharmacological approach, with a median of 3.7 visits/calls per patient. In addition, 20.3% needed a medication switch due to potential interactions between psychotropics and drugs used to treat SARS-CoV-2.

**Discussion:** In our study, up to 5.6% of SARS-CoV-2 hospitalized patients needed a psychiatric evaluation, especially for anxiety and mood symptoms. Psychosocial factors associated with the pandemic, drugs used to treat the infection, or a direct causative effect of the virus may explain our findings.

**Keywords:** COVID-19, SARS-CoV-2, liaison psychiatry, mental health, psychological counseling

## INTRODUCTION

SARS-CoV-2 is a novel coronavirus first detected in the Wuhan area, China, in December 2019 (1). It has progressively expanded through China and eventually became an international pandemic. Our study took place in the Cruces University hospital, a third-level hospital in Basque Country, Spain. At the moment of this study, in March 2020, our hospital admitted more than 700 inpatients due to SARS-CoV-2 infection, and Spain was, in fact, one of the more severely affected countries (2).

SARS-CoV-2 is a coronavirus (3), which is a group of single-stranded RNA viruses that can cause upper respiratory infections in humans. The COVID-19 symptom spectrum is vast and ranges from an asymptomatic infection in up to 20% of patients to severe pneumonia requiring hospitalization and death (1, 4, 5). Although it primarily affects the airway and the lungs, the virus can also attack the kidneys, the liver, and the central nervous system and cause multi-organ failure. In China, the mortality rate has been estimated to be 1.38%, increasing with age and increasing to 13.4% in those aged 80 or older (5).

Men have a higher mortality rate and an increased risk of admission to the ICU than women (6). Although the organic prognosis is worse, the psychological impact remains better in men: women infected with SARS-CoV-2 report more perceived helplessness than men do (7) and have higher scores in depression and anxiety scales (8). It has to be clarified whether biological or sociocultural variables explain these gender differences.

## Neuropsychiatric Manifestations of the Infection

Like other viruses of this group, the SARS-CoV-2 has shown neurotropic capacity *in vitro* models (9–11), as well as CNS inflammation and demyelination (9). Therefore, psychiatric symptoms are theoretically feasible, but it is unclear whether they come from a direct insult of the nervous system, the psychosocial distress related to the infection, or both.

Preclinical data confirm that COVID-19 is associated with neurological and neuropsychiatric symptoms (12–15). A case series from Wuhan found that 36% of inpatients showed neurological symptoms, mainly dizziness and headache. Some of them also presented with cerebrovascular disease in the course of their illness (16). In a detailed clinical report by Paterson et al. (12), they describe para- and post-infectious encephalitis such as ADEM and transverse myelitis. Taquet et al. (15) recently examined the estimated incidence of any neurological or psychiatric diagnosis 6 months after a first COVID-19 diagnosis, finding an overall percentage of 33% and up to 46.42% on those previously admitted to an intensive care unit. The risk of affective and anxiety disorders increased compared to the control group and the risk of psychosis.

Another important nosology is Post-Acute COVID-19 syndrome, defined as persistent symptoms and delayed or long-term complications beyond 4 weeks from onset. It has been described that in the long term, the symptoms of depression and anxiety are related not so much to the severity of the medical

condition as to the appearance of physical sequelae (17). Post-Acute COVID-19 syndrome courses with fatigue, dyspnea, hair loss, attention deficit, and depression. In up to 60% of patients, the most common symptom is fatigue (18), and 30% may develop depressive symptoms. There is also evidence that coronavirus has long-term repercussions on cognition. Hampshire et al. (19) describe how individuals who have survived COVID-19 respond worse on cognitive tasks than would be expected for their age and academic level.

## Psychiatry Liaison During the Pandemic

Consultation-liaison psychiatry, also known as psychosomatic medicine, is a subspecialty of psychiatry that focuses on the care of patients with comorbid psychiatric and general medical conditions at the request of the medical or surgical treating physician. During the first wave of the pandemic, many centers considered clinical psychologists and psychiatrists non-essential personnel and were discouraged from entering isolation wards of COVID-19 patients (20). For this reason, many psychiatric services reduced their workload (21–23), although there are singular examples of Psychiatry Liaison increased referrals (24).

Psychiatrists had diverse duties during the peak of the pandemic. For example, drugs used experimentally to treat the infection (such as protease inhibitors) interacted with psychotropics through the P450 cytochrome system. As a result, they could prolong the QT interval (25–27), so medication adjustments were necessary. Patients with previous psychiatric history treated with psychotropic drugs were at a high risk of developing adverse effects or abrupt changes in drug levels in plasma through pharmacokinetic interactions, so they required close follow-up during hospitalization. Corticoids used to reduce inflammation carry the risk of severe psychiatric side effects: they can cause affective and psychotic symptoms and increase the risk of relapse in those already diagnosed with a psychiatric disorder (28).

We aimed to describe the profile of SARS-CoV-2 positive patients in which a psychiatry consultation was required in our hospital. We also described our psychiatric interventions during the peak of the pandemic.

## MATERIALS AND METHODS

### Study Design

This is a cross-sectional descriptive study. This study was carried out within the Department of Psychiatry of Cruces University Hospital (Basque Country, Spain), a hospital that comprises 900 inpatient beds and covers 550,000 people. Data from each psychiatric consultation within our consultation-liaison service were consecutively obtained during 1 month from March 17 (4 days after the state of emergency was declared in Spain) to April 17, 2020. A total of 721 hospitalizations of SARS-CoV-2 positive patients took place during this time frame.

### Participants and Sources of Information

In the present study, we used a non-probability sampling method. All COVID-19 inpatients that were consecutively referred to our psychiatry liaison service were selected for



analysis. Sociodemographic variables such as age, gender, and psychiatric history according to the International Classification of Diseases (ICD-10) were extracted from patient history. We considered past psychiatric history as any psychiatric diagnosis of the ICD-10. The severity of pneumonia was assessed using the CURB 65 scale, an instrument used to determine the severity of pulmonary infections that also serve as a predictor of prognosis in the coronavirus infection (29, 30). We also collected the referrals' characteristics, such as date, sources (medical specialties), and primary reasons for consultation. Finally, we took other variables regarding intervention and outcome: psychopharmacological intervention, number of visits, and destination at discharge.

The Service of Preventive medicine provided general data on the number of hospitalized COVID-19 infections.

## Type of Intervention

We carried out two basic types of intervention: face-to-face and telephonic interviews. Following CDC recommendations, whenever possible, telematic communication was preferred to limit healthcare workers' exposure to the virus. We stated that telephonic interviews would initially manage referrals whose objective was crisis intervention or anxiety management. In general, those patients presenting with psychotic symptoms, severe behavioral disturbances, and suicide ideation were evaluated face-to-face from the beginning. We also provided familiar crisis intervention if needed. Medication interactions between COVID-19 treatment and concomitant psychotropic drugs were in all cases assessed and switched to safer options if indicated by clinical guidelines.

## Telephonic Crisis Intervention

A crisis can be defined as a period of psychological disequilibrium triggered by a hazardous event. We followed the guide of the Crisis Intervention by Telephone book by Lester (31). The use of telephone interviews is controversial; some authors stated that its use could even question the profession of psychiatry (32). However, according to the extensive research by Lester, telematic counseling may even be more effective in some situations, such as acute anxiety or those disorganized patients that cannot handle face-to-face intervention. Telephone interviews have unique features: they potentiate patient control and anonymity, facilitating self-revelation and openness; it is an accessible and immediate way of communication and can even promote positive transference (31). A meta-analysis published by Hubley et al. revealed that patients and providers were both satisfied with telepsychiatry. It was comparable to face-to-face in terms of reliability of clinical assessments and treatment outcomes (33).

## Face-to-Face Intervention

Our team was equipped with protective clothing, surgical gloves, face shields, and FFP2 face masks during all face-to-face interventions. In addition, we kept a minimum of 2 m between the staff and the patient and avoided all physical contact with patients and objects inside the room.

## Statistical Methods

Descriptive statistics for the study were performed. Categorical data were reported as frequencies and percentages, while continuous data were presented as median and standard deviation. Statistical analysis was carried out using IBM® SPSS® Statistics version 25.0 (IBM GmbH, Ehningen, Germany).

## Ethics

The Cruces University Hospital Ethics Committee approved this study as part of an ongoing database within our psychiatry department.

## RESULTS

### Patients

We received a total of 43 SARS-CoV-2-positive referrals, of which  $n = 16$  (37.2%) were men and  $n = 27$  (62.8%) were women. In 9.3% of patients, the intervention was requested for a family intervention. The median age was 61 (SD 14) years old. The

**TABLE 1 |** Clinical characteristics of COVID-19 psychiatry liaison referrals.

Sex	Male: 16 (37.2%) Female: 27 (62.8%)
Age (median)	61 (SD 14)
Psychiatric diagnosis	No psychiatric history: 18 (41.9%) F.05 Delirium: 3 (7%) F.07 Organic personality disorders ... 1 (2.3%) F.10 Alcohol 1 (2.3%) F.20 Schizophrenia: 1 (2.3%) F.22 Delusional disorder: 1 (2.3%) F.25 Schizoaffective disorder: 2 (4.7%) F.28 Other psychotic disorders: 1 (2.3%) F.31 Affective bipolar disorder 2 (4.7%) F.32 Depressive episode: 3 (7.0%) F.33 Recurrent depression: 3 (7.0%) F.41 Other anxiety disorders: 2 (4.7%) F.43 Adjustment disorder: 3 (7.0%) F. 69 Borderline personality: 1 (2.3%) F.73 Severe cognitive impairment: 1 (2.3%)
Comorbidities	No coexisting disease: 9 (20.9%) Hypertension: 4 (9.3%) Diabetes: 1 (2.3%) Coronary disease: 1 (2.3%) COPD: 2 (4.7%) Cancer: 1 (2.3%) Chronic renal disease: 1 (2.3%) Two or more: 19 (44.2%) Others: 5 (11.6%)
Treatment	Antivirals: 36 (83.7%) Antibiotics: 28 (65.1%) Corticoids: 20 (46.5%) Immunoglobulins: 1 (2.3%) Hydroxychloroquine: 33 (76.7%) Mechanical ventilation: 10 (23.3%)

median age for men was 62.2 (SD 17.6) and 60.5 (SD 11.5) for women.

A complete list of clinical data is shown in **Table 1**. The majority of patients (58.1%) presented past psychiatric history at the moment of the referral, and most of them (44.2%) had two or more coexisting organic illnesses.

Regarding COVID infection severity at hospital admission, most patients had a CURB 65 score of 0 (37.2%), a score of 1 in 20.9%, 2 in 11.6%, and 3 in 9.3%. A total of 20.9% of patients did not have the score calculated at the moment of hospitalization. Frequent treatments comprised antivirals, hydroxychloroquine, and corticoids (**Table 1**). In 23.3%, mechanical ventilation was needed.

### Referral Features

A total of 721 patients were admitted to our hospital as inpatients due to COVID infection during the study period. Of them, 43 needed a psychiatric evaluation (5.6%) (**Figure 1**). The services requesting a psychiatric consultation and the reasons for it are depicted in **Table 2**. The most frequent source of referrals was the Infectious Disease Department, reaching up to 37.2% of the requests. The most frequent reason was patient anxiety (25.6%) followed by depressive mood (18.6%) and adjustment of medication (18.6%).

### Psychiatric Intervention and Outcome

Patients received a median of 3.7 visits/calls during hospitalization. We visited men a median of 4.1 (SD 1.7) times and women a median of 3.5 (SD 2.5) times, but these differences did not reach statistical significance.

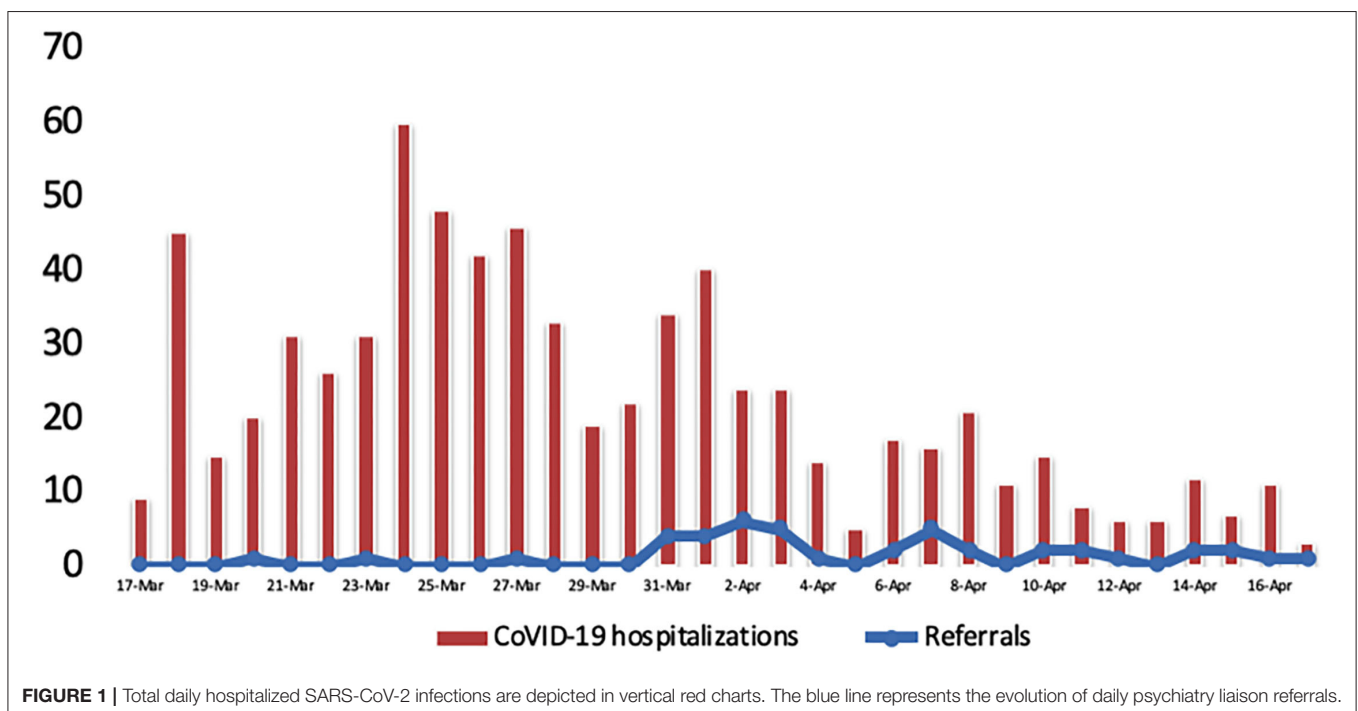
In 58.1% of the referrals, the intervention took place by telephone. The rest needed a face-to-face approach. Regarding

psychotherapeutic interventions, 67.4% received psychological counseling or psychotherapy support services. Psychological counseling was more frequent in telephone interventions than in face-to-face assessments (84 vs. 44.4%), reaching statistical significance ( $p < 0.05$ ).

Over the total amount of patients, antipsychotics were prescribed in 34.9% and benzodiazepines in 20.9%. No other drug classes such as SSRI or mood stabilizers were initiated in any individual. There was a need for treatment switch in 20.9% of patients to avoid the risk of pharmacokinetic interactions. In all cases, safer options were administered until the end of the COVID-19 course of treatment following guideline recommendations.

**TABLE 2 |** Psychiatric diagnosis after evaluation of the referrals.

ICD-10 diagnosis	Percentage
No psychiatric diagnosis	1 (2.3%)
F.05 Delirium	8 (18.6%)
F.20 Schizophrenia	1 (2.3%)
F.22 Delusional disorder	1 (2.3%)
F.25 Schizoaffective disorder	2 (4.7%)
F.28 Other psychotic disorders	1 (2.3%)
F.30 Manic episode	1 (2.3%)
F.31 Affective bipolar disorder 2	2 (4.7%)
F.32 Depressive episode	2 (4.7%)
F.41 Other anxiety disorders	1 (2.3%)
F.43 Adjustment disorder	5 (11.6%)
F.69 Borderline personality	1 (2.3%)
F.73 Severe cognitive impairment	1 (2.3%)
Z code	14 (32.5%)



**FIGURE 1 |** Total daily hospitalized SARS-CoV-2 infections are depicted in vertical red charts. The blue line represents the evolution of daily psychiatry liaison referrals.

**TABLE 3** | Referral features ( $n = 43$ ).

Source (Specialty)	Intensive care unit: 5 (11.6%)
	Internal medicine: 6 (14%)
	Respiratory medicine: 11 (25.6%)
	Infectious disease: 16 (37.2%)
	Gynecology and obstetrics: 2 (4.7%)
	Emergency medicine: 2 (4.7%)
	Cardiology: 1 (2.3%)
Reason	Anxiety: 11 (25.6%)
	Low mood: 8 (18.6%)
	Family crisis: 4 (9.3%)
	Delirium: 2 (4.7%)
	Medication adjustment: 8 (18.6%)
	Follow-up of psychiatric patients: 2 (4.7%)
	Suicidal ideation: 1 (2.3%)

The most frequent diagnosis (32.5%) was *Z-code (Factors influencing health status and contact with health services)* categorized in the ICD-10. Delirium not induced by alcohol or other drugs (F.05) was diagnosed in 18.6% of patients. Finally, there was one manic episode that was categorized as treatment-related and one depressive episode with psychotic symptoms that required psychiatric hospitalization. The complete list of psychiatric diagnoses at discharge is represented in **Table 3**.

Regarding outcomes, hospital-to-home discharge occurred in 27 (62.8%) of patients. A total of 11 (25.6%) remained hospitalized at the moment of the analysis, and 3 (7%) were transferred to another medical hospital. One individual (2.3%) was sent to an inpatient psychiatry facility, and 1 (2.3%) of the 43 individuals died.

## DISCUSSION

In our study, we analyzed the features of the psychiatric referrals during the first wave of the pandemic. In total, 5.6% of the COVID-19 patients admitted to our hospital needed a psychiatric evaluation at the request of the referent doctor. This number is lower than other studies in which 25% of coronavirus-infected patients required a psychiatric assessment (34).

We observed that the referral rate changed over time: it remained low while the hospitalization curve trended upward and increased after the peak of the first wave (Image 1). We hypothesize that during the rising phase of the curve, when little was known about the virus and protocols were in constant change, all referrals were kept to a minimum to avoid medical staff exposure and save protection equipment. On March 31, we implemented a phone-based psychological support program, explaining the increase in referrals. Another explanation may be a general reduction of activity, seen not only in psychiatry but also in other disciplines (35, 36), although we did not specifically evaluate this in our study. For example, Butler et al. found a 40% reduction of liaison psychiatry consultations during the first wave (23). Other studies report a marked decrease

of referrals, specifically during March 2020, which returned to normal afterward (37). These data contrast with studies during the second wave in which the number of liaison psychiatry consultations increased by 18.8% (22).

In our sample, we found a high proportion of acute anxiety and low mood symptoms, in line with previous studies that analyzed the prevalence of depression and anxiety in COVID-19 patients (38–40). Complete isolation during treatment, fear of the unknown, or the lack of emotional support over the hospitalization may explain this finding. Still, the infection already increases the risk of anxiety or affective disorders (13, 41). In addition to this, previous research has established “sickness behavior” (42), a pattern of adaptive behavioral changes that occur in both animals and humans in response to infection or inflammatory processes. It consists of low mood, anxiety, and social isolation, which we also observed in our COVID-19 referrals.

Delirium is a common symptom of COVID-19 disease, ranging from 25 to 33% in previous studies (43, 44). It constituted 18.6% of the diagnosis made in our referrals. Although not reported, most delirious patients presented with florid psychotic symptoms and behavioral disturbances that were, in some cases, a diagnostic challenge. However, other characteristic features such as fluctuating course and attention impairment were almost always present. Delirium is usually multifactorial: the old age of our patients, with a median age of 61 years old, polypharmacy, and the infection itself may contribute to its development.

In our sample, the medication used to treat the infection comprised mainly antivirals and hydroxychloroquine, which were used experimentally during the first wave of the pandemic. Ritonavir is a well-known CYP3A4 inhibitor, and therefore in 20.3% of our total referrals, a change in medication was necessary to avoid interactions. If we consider only those patients with a prior psychiatric history, this percentage goes up to 37.5%. This confirms previous research reporting an elevated risk of pharmacokinetic interactions in psychiatric patients (28), a fact that acquires particular relevance in a SARS-CoV-2 infection setting. In addition, we report a case of first episode of mania presumably attributed to steroid therapy that was effectively addressed with Olanzapine. We did not identify any first psychotic episodes. However, it has been proved that the risk of a psychotic disorder is augmented during the SARS-CoV-2 illness, and there are case reports of new-onset psychosis after infection (15, 45–47).

In our study, we also describe the interventions by our team. Although some centers decided to evaluate all patients face-to-face (34), our protocol stated telephonic intervention would be preferred when possible. Still, 42.9% of patients had to be interviewed face-to-face to carry out an optimal psychopathological exploration, a situation that in all cases required us to wear Personal Protective Equipment (PPE). The median visit per patient was 3.7, but one patient needed up to 17 interventions due to the severity of his symptoms and the longer-than-average length of COVID-19 hospitalizations. In other cases, face-to-face interviews were unavoidable due to the

often scarce and confusing information obtained by phone calls, leading to doubts in the diagnosis.

## STRENGTHS AND LIMITATIONS

We registered all the referrals to our psychiatric liaison service in a snowball fashion; therefore, there is a risk of bias, and the results cannot be extrapolated to the general population. Also, the small sample limits the statistical power of potential comparisons within groups. Nevertheless, the main strength of our study is that it represents a comprehensive picture of the role of a psychiatry service during the first wave of the pandemic, with a specific focus on the interventions by liaison subspecialty. However, as we did not use psychometric scales, it is also difficult to compare results.

## CONCLUSIONS

For psychiatrists working in liaison psychiatry, the novel COVID-19 was a challenge in which the course of action with hospitalized patients had to be reformulated. It forced psychiatrists to change their previous intervention settings and working strategies. More research is needed not only to obtain a complete picture of the psychiatric symptoms of the coronavirus disease but also to understand the different patterns of psychiatry liaison care during the pandemic.

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## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The present study was approved by the Cruces University Hospital Ethics Committee as part of an ongoing observational study in our psychiatry department. This study aims to describe all the patients treated in our unit, both inpatients and outpatients. Due to the exceptional circumstances regarding COVID-19 isolation policies, written informed consent could not be systematically signed and we obtained verbal consent instead. In those patients whose capability was impaired, a legal representative was informed and gave consent. Patient anonymity was in all cases preserved and we analyzed only aggregated data.

## AUTHOR CONTRIBUTIONS

ML-A, JG-B, SF-S, JC-G, and AP-R collected patient data. AA-A collected epidemiological data of total hospitalized infections. ML-A and AA-A analyzed the data. ML-A, JC-G, and MS-H wrote the manuscript. All authors approved the final work.



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# Negative Emotions in Chinese Frontline Medical Staff During the Early Stage of the COVID-19 Epidemic: Status, Trend, and Influential Pathways Based on a National Investigation

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**Objective:** The outbreak of coronavirus disease 2019 (COVID-19), declared as a major public health emergency, has had profound effects on public mental health especially emotional status. Due to professional requirements, medical staff are at a higher risk of infection, which might induce stronger negative emotions. This study aims to reveal the emotional status of Chinese frontline medical staff in the early epidemic period to better maintain their mental health, and provide adequate psychological support for them.

**Methods:** A national online survey was carried out in China at the early stage of the COVID-19 epidemic. In total, 3025 Chinese frontline medical staff took part in this investigation which utilized a general information questionnaire, the Emotion Regulation Questionnaire (ERQ), and the Berkeley Expressivity Questionnaire (BEQ).

**Results:** At the early stage of COVID-19, anxiety was the most common negative emotion of Chinese medical staff, followed by sadness, fear, and anger, mainly at a mild degree, which declined gradually over time. Nurses had the highest level of negative emotions compared with doctors and other healthcare workers. Women experienced more fear than men, younger and unmarried medical staff had more anxiety and fear compared with elders and married ones. Risk perception and emotional expressivity increased negative emotions, cognitive reappraisal reduced negative emotions, while negative emotions led to more avoidant behavior and more physical health disturbances, in which negative emotions mediated the effect of risk perception on avoidant behavior tendency in the model test.

**Conclusion:** Chinese frontline medical staff experienced a mild level of negative emotions at the early stage of COVID-19, which decreased gradually over time. The findings suggest that during the epidemic, nurses' mental health should be extensively attended to, as well as women, younger, and unmarried medical staff. To better ensure their mental health, reducing risk perception and improving cognitive reappraisal might

be important, which are potentially valuable to form targeted psychological interventions and emotional guidance under crisis in the future.

**Keywords: COVID-19, negative emotion, status, trend, influential pathway, Chinese frontline medical staff**

## INTRODUCTION

Coronavirus disease 2019 (COVID-19), similar to SARS in 2003, has been declared as a major public health emergency (1), and has had a profound influence on personal mental health (2, 3). Up to May 4, 2020, there were 3,349,786 confirmed cases and 238,628 deaths because of COVID-19 worldwide (4). Millions of medical staff worked on the frontline to fight against the disease, making them face a high risk of infection (5, 6) and huge mental pressure (7, 8). Thousands of Chinese medical personnel combated with COVID-19 on the frontline, of whom over 3,000 medical staff were infected with the virus as of February 20, 2020 (8). Therefore, the COVID-19 epidemic can be regarded as a crisis event for the general population especially for those frontline medical staff.

According to Myer and Conte's (9) triage assessment system (TAS) for crisis intervention, reactions to crisis events are divided into three domains: affective or emotional, behavioral, and cognitive. The TAS model offers us an understanding about the type of reactions people experience as well as the intensity of these reactions in crisis. TAS can also provide a quick, accurate, and easy-to-use method that is directly usable in the intervention process and can monitor individuals' progress during the crisis intervention process. Thus, the TAS model is not only a valuable tool in the assessment of individual reactions in crisis but also a guide in the identification of the complex interaction among the three domains (9).

The first and most significant response under crisis is emotional response. Fear, anxiety, anger, and sadness are universal negative emotions among medical staff when facing sudden and arduous public health issues (10, 11). Studies revealed (10) that fear was a prominent emotional response among healthcare workers, and 1.4 times that compared with non-clinical staff (12). Taking the SARS epidemic as an example, frontline medical personnel were more likely to experience stronger negative emotions, such as the fear of being infected themselves or infecting their family members and anxiety of uncertainty (10, 13, 14). Additionally, anxiety was another common negative emotion among medical personnel (15). Medical staff working in emergency, ICU, and respiratory departments were two times more likely to suffer from anxiety (12). As to the gender difference, women had more anxiety compared with men (16). Being female, having frequent contact with patients, inadequate protective supplies, and being overloaded work were all related to the high level of anxiety (17, 18), which might contribute to emotional exhaustion (19). Besides, healthcare workers also experienced anger and sadness during SARS (13). A variety of factors might increase substantial psychological stress on medical staff (11, 13), such as shortage of protective supplies, direct contact with patients, and overloaded work, which might increase the infection rate of medical staff

consequently (17, 20, 21). Although there exist studies on the negative emotions of medical staff during past epidemics, previous studies did not observe the status and sources of negative emotions of medical staff in detail, which is guaranteed to better maintain their mental health, as well as to provide adequate psychological support for them.

Nevertheless, different medical professionals may have different negative emotional responses. Studies reported (22) that nurses were more worried compared with doctors during the A/H1N1 influenza pandemic. The overall level of distress of nurses was significantly higher than that of other medical staff (23). During the COVID-19 epidemic, nurses reported experiencing more severe mental health symptoms than those of physicians (16). However, the emotional status and trend of negative emotions at the early stage of the epidemic were not systematically investigated, which was potentially important to develop more targeted psychological support toward different types of medical staff, since they were equally treated in the current psychological intervention (23).

In terms of emotional states, personal emotions fluctuate instead of sustaining (24). As Gross (24) pointed out, an individual's emotions unfold over seconds to minutes, which suggests the dynamic changes of emotions as time goes by. The latest cross-sectional survey (12) on the COVID-19 epidemic investigating 2042 medical staff from Fujian Provincial Hospital in China revealed that about 70.6% of the medical staff suffered from a moderate to severe level of fear, and 22.6% had a mild to moderate level of anxiety. However, this investigation was carried out at very early stage of this epidemic (January 24, 2020), and did not continue to monitor the emotion change of medical staff. The trend of negative emotions of Chinese medical staff is needed to explore timely and targeted psychological support in different periods of COVID-19. In previous epidemics, studies found (19, 25) that the fear and anxiety of medical staff appeared immediately and then decreased at the early stage of the epidemic, indicating that the early epidemic stage would be a critical period to monitor the negative emotional responses of frontline medical staff, as well as to provide timely psychological assistance. We thus supposed that negative emotions might be continuously decreasing from the initial phase of the epidemic.

So far, only the negative emotion reaction under crisis has been discussed, while according to Myer's TAS model, cognitive and behavioral reactions of frontline medical staff also need to be paid attention to. Facing the COVID-19 crisis event, a full understanding of the negative emotional responses and its influential factors from cognitive and behavioral domains might help to provide comprehensive information to formulate effective psychological interventions in future.

Studies reported (26) that risk perception in the cognitive domain might induce negative emotion. One study showed (27) that the level of fear elevated when people perceived a

higher risk perception of SARS. Kushnir et al. (28) also reported that people tended to overestimate the risk of events that rarely happened while eliciting intense fears. Moreover, irrational risk perception would bring unnecessary anxiety and panic in turn (26). According to the Health Belief Model (29), risk perception could also influence individual behaviors. The high risk perception could affect medical staff's willingness to care for patients, especially when they were afraid of infecting their family members (30). Therefore, it could be assumed that the risk perception might influence the negative emotions and behavior of frontline medical staff under this epidemic.

Emotions might change behavior pattern. In terms of the relationship between negative emotion and behavioral reaction, studies revealed that fear was linked with avoidant behavior for protecting individuals from dangers (31, 32). For example, some medical staff were reluctant to work or determined to resign due to the fear of being infected or infecting their family members during the SARS epidemic (17, 33). The results suggested that negative emotions might promote the avoidant behavior tendency of medical personnel in the present epidemic, which need further evidence.

Stress would not only induce negative emotions, but also activate physical response. As mentioned above, the high level of negative emotion might cause physical function disturbance of frontline medical staff during an epidemic, such as headaches (7), anorexia (10), sleep disorders (34), and pain (35). Indeed, medical staff experienced more physical symptoms such as burnout, insomnia, and anorexia (10, 11, 13). However, the influence of negative emotions on the physical health of medical staff remains unknown under COVID-19, and we supposed that focusing on the physical response of frontline medical staff could broaden Myer's TAS theoretical system and reflect individual response toward COVID-19 more systematically.

Moreover, emotion regulation defined as the attempt to affect the way that one experiences or expresses emotions (24), can be used to help frontline medical staff deal with emotion reactions under the COVID-19 crisis. Gross and John (36) proposed that cognitive reappraisal and expressive suppression were two common emotion regulation strategies. Cognitive reappraisal, defined as the attempt to reinterpret the situation eliciting the emotion in the manner of changing its emotional impact (37, 38), could reduce negative emotions as reported (37, 39). While expressive suppression is defined as the attempt to hide, suppress, or reduce the ongoing emotion-expressive behavior (40). Cognitive reappraisal is related to healthier emotion and better wellbeing compared with expressive suppression (41). Additionally, emotional expressivity, which means expressing emotion through verbal, non-verbal, and physiological channels (42), also has an influence on negative emotions besides cognitive reappraisal and expressive suppression. Gross also pointed out that emotional expressivity as an opposite regulation strategy of expressivity suppression, might have a unique influence on emotions, correlating with negative emotion and mental health problems (43). Importantly, a study showed (44) that only expressive suppression significantly modulated fear under an epidemic, while other emotional regulation strategies did not, which suggested that different types of emotional regulation had

different effects on fear emotion. However, previous research usually observe the effect of emotion regulation strategies on emotion in total, while the effect of different types of emotional regulation strategies on different types of emotions under crisis was not systematically revealed.

In summary, our present study aims to investigate the emotional status of Chinese frontline medical staff at the early period of the COVID-19 epidemic, and further explore its trend and influential pathway. Our hypotheses were:

- 1) Chinese frontline medical staff might have a certain degree of negative emotions at the early stage of the COVID-19 epidemic;
- 2) Nurses might have a higher level of negative emotions compared with other medical professionals;
- 3) At the early stage of the COVID-19 epidemic, negative emotions of the Chinese frontline medical staff might decrease significantly;
- 4) Risk perception and emotion regulation might influence negative emotion;
- 5) Negative emotion might have a potential effect on avoidant behavior tendency and physical health;
- 6) Negative emotion might have a mediation effect between risk perception and avoidant behavior tendency and physical health.

## METHODS

### Participants

A cross-sectional online survey was used to assess the emotional responses of Chinese frontline medical staff with a convenience sampling method. Doctors, nurses, and other medical staff, who cared for COVID-19 patients in the designated hospitals during this epidemic were eligible for this online national investigation from January 27 to February 11, 2020. Participants answered the questionnaire through an online link based on their personal will. A total of 4,100 medical staff responded, and 3,025 questionnaires were completed, which were from all provinces in China. Incomplete and halfheartedly filled in questionnaires were excluded from formal analysis. As depicted in **Supplementary Table 1**, there were 1,916 (63.3%) women and 1,109 (36.7%) men, aged between 20 and 65 years old. Among them, 1,237 (40.9%) were doctors, 1,371 (45.3%) were nurses, and 417 (13.8%) were other medical staff. In addition, 1,852 (61.2%) were married, 1,067 (35.3%) were unmarried, and 106 (3.5%) were divorced or widowed. Over 96.6% of the participants had college and postgraduate or higher educational levels. The participants covered all provincial administrative regions in China, which were divided into six groups of provinces according to the number of confirmed cases (above 10,000, 1,000–9,999, 500–999, 100–499, 10–99, and 1–9).

### Instruments

**General information:** Basic information about demographic characteristics, including gender, age, degree of education, marital status, and city (number of confirmed cases above 10,000, 1,000–9,999, 500–999, 100–499, 10–99, and 1–9) were collected.



**Negative emotions:** To collect the degree of negative emotions, four questions were designed with five options (none, mild, moderate, severe, extremely severe/unbearable): How fearful (anxious, angry, sad) do you feel today? Exploratory factor analysis (EFA, principal axis factoring (PAF)) and reliability analysis were carried out and found that the KMO of this scale was 0.797, which accounted for as much as 64.931% of the total variance; the Cronbach's alpha was 0.82. Cognitive sources for negative emotions are listed in the **Supplementary Materials**.

**Risk perception:** To observe people's risk perception during the epidemic, three questions were designed (yes or no): "This is a severe outbreak," "Epidemic is close to me," "I am in danger." Exploratory factor analysis [EFA, principal axis factoring (PAF)] and reliability analysis were carried out and found that the KMO of this scale was 0.622, which accounted for as much as 57.94% of the total variance; the Cronbach's alpha was 0.635.

**Cognitive sources of public anxiety:** To explore possible sources of public anxiety, 12 questions were investigated (yes or no): Do you feel anxious about the new confirmed cases, possible infection without isolation, death number, shortage of protective supplies, new suspected cases, possible infection without protection, new foci, insufficient cooperation of patients, insufficient protection, being isolated due to the epidemic, insufficient duty of medical staff, and others?

**Cognitive sources of public anger:** To explore possible sources of public anger, 10 questions were surveyed (yes or no): Do you feel anger about irresponsible rumors, possible infection without isolation, possible infection without protection, insufficient cooperation of patients, shortage of protective supplies, insufficient attention of unit, insufficient duty of medical staff, unsupported by families, being isolated due to the epidemic, and others?

**Cognitive sources of public sadness:** To explore possible sources of public sadness, eight questions were investigated (yes or no): Do you feel sadness about innocent people, shortage of protective supplies, helpless patients, exhausted medical staff, being infected by the virus, being isolated due to the epidemic, unsupported by families, and others?

**Cognitive sources of public fear:** To explore possible sources of public fear, 14 questions were investigated (yes or no): Do you fear being infected by the virus, infection of families, possible infection without isolation, new confirmed cases, death after infection, shortage of protective supplies, possible infection without protection, death number, disrupted work or study after the epidemic, new foci, new suspected cases, insufficient cooperation of patients, being isolated due to the epidemic, and others?

**Avoidant behavior tendency:** To observe potential avoidant behavior tendency during the epidemic, three questions were designed (yes or no): "I am intending to run away if possible," "To escape isolation, I might not go to hospital if I am a suspected case," "To protect myself and families, I might quit the job if I am a medical staff member." The KMO of this scale was 0.687, which accounted for as much as 77.88% of the total variance; the Cronbach's alpha was 0.857.

**Disturbed physical function:** To observe potential disturbed physical health during the epidemic, three questions were designed (yes or no): "Within the past week, I cannot keep my

regular schedule as usual," "Within the past week, I cannot eat as well as usual," "Within the past week, I cannot sleep as well as usual." The KMO of this scale was 0.602, which accounted for as much as 56.20% of the total variance; the Cronbach's alpha was 0.607.

**Emotional regulation strategies:** The Emotion Regulation Questionnaire (ERQ) with 10 items was used in this investigation, which was designed by Gross and John (36) and translated into Chinese in 2007 (45). High scores indicate higher cognitive reappraisal and expressive suppression, respectively. The Cronbach's alpha coefficient was 0.827 for cognitive reappraisal and 0.714 for expressive suppression in this study.

The Berkeley Expressivity Questionnaire (BEQ) (43) was also used to observe personal emotional expression, which is comprised of 16 items and 3 subscales: impulse strength, negative expressivity, and positive expressivity. The Cronbach's alpha coefficient was 0.834 in this study.

## Procedures

Questions were designed and edited as an online questionnaire, which was approved by the Human Research Ethics Committee of the Army Medical University of China and Wenjuanxing online platform ([www.wjx.top](http://www.wjx.top)), a platform providing functions equivalent to Amazon Mechanical Turk. From January 27 to February 11, 2020, participants answered the questionnaire through an online link with their personal cellphone or computer based on his/her individual will; there was no adverse consequence if they refused or did not have time to fill in the online questionnaire. Each person took about 10–15 min to complete the questionnaire after they signed the electronic version of the informed consent form. All participants could get a professional psychological consultation and aid *via* the hotline at the bottom of the electronic questionnaire.

## Statistics

An independent *t*-test and one way ANOVA were conducted to observe the demographic characteristics of negative emotions. Independent *t*-test analysis was also carried out to observe the influence of risk perception on negative emotions. The Chi-squared test was carried out to observe the effect of negative emotions on avoidant behavior tendency and disturbed physical function. Pearson correlation was carried out to observe the correlation between negative emotions, risk perception, emotional regulation, avoidant behavior, and disturbed physical function. A structural equation model was carried out with AMOS 24.0 to test the interaction between variables based on the TAS theory model.

## RESULTS

### The Negative Emotional Status of Frontline Medical Staff

#### The Demographic Characteristics of Negative Emotions

To observe the negative emotional features of frontline medical staff, an independent two-sample *t*-test and one-way ANOVA analysis were conducted, which indicated (**Supplementary Table 1**) that women had a higher level of

fear compared with men [ $t_{(3,023)} = -3.288, p = 0.001$ , Cohen's  $d = 0.12$ ]. Medical staff aged 40–49 years old had lower levels of anxiety [ $F_{(3,3,021)} = 5.026, p = 0.002$ , partial- $\eta^2 = 0.005$ , and fear [ $F_{(3,3,021)} = 3.417, p = 0.017$ , partial- $\eta^2 = 0.003$ ]. Medical staff with postgraduate degrees or higher reported lower fear levels [ $F_{(3,3,021)} = 2.763, p = 0.041$ , partial- $\eta^2 = 0.003$ ]. Unmarried medical staff reported higher levels of anxiety [ $F_{(3,3,021)} = 3.200, p = 0.022$ , partial- $\eta^2 = 0.003$ ] and fear [ $F_{(3,3,021)} = 3.564, p = 0.014$ , partial- $\eta^2 = 0.004$ ]. As expected, medical staff from the city (over 10,000 confirmed cases) had higher levels of anxiety [ $F_{(3,3,021)} = 2.440, p = 0.004$ , partial- $\eta^2 = 0.032$ ] and anger [ $F_{(3,3,021)} = 3.412, p = 0.004$ , partial- $\eta^2 = 0.006$ ].

### The Negative Emotions of Different Medical Staff

One way ANOVA (Figure 1A) showed that among the negative emotions, anxiety was the most prominent emotion in medical staff, followed by sadness, fear, and anger [ $F_{(3,12,096)} = 174.075, p < 0.001$ , partial- $\eta^2 = 0.041$ ]. The response selection rates of anxiety, sadness, fear, and anger were 78.3, 67.5, 68, and 45.8%. And 32.8–55.2% of medical staff rated their emotion at a mild degree. Further analysis (Supplementary Table 2) showed that compared with doctors and other medical staff, nurses had higher selection rates of anxiety [ $\chi^2_{(2,3,025)} = 16.776, p < 0.001$ ], sadness [ $\chi^2_{(2,3,025)} = 11.908, p < 0.001$ ], fear [ $\chi^2_{(2,3,025)} = 49.976, p < 0.001$ ], and anger [ $\chi^2_{(2,3,025)} = 21.270, p < 0.001$ ].

Figure 1B shows that nurses also reported higher levels of anxiety [ $F_{(2,3,022)} = 8.347, p < 0.001$ , partial- $\eta^2 = 0.005$ ], sadness [ $F_{(2,3,022)} = 7.732, p < 0.001$ , partial- $\eta^2 = 0.005$ ], fear [ $F_{(2,3,022)} = 34.630, p < 0.001$ , partial- $\eta^2 = 0.022$ ], and anger [ $F_{(2,3,021)} = 9.719, p < 0.001$ , partial- $\eta^2 = 0.006$ ]. The results indicated that nurses experienced stronger negative emotions compared with other medical staff.

### The Trend of Negative Emotions Over Time

Figure 2A shows that the levels of negative emotions gradually declined over time during the early stage of the epidemic [anxiety:  $F_{(15,3,009)} = 3.199, p < 0.001$ , partial- $\eta^2 = 0.016$ , sadness:  $F_{(15,3,009)} = 2.016, p = 0.011$ , partial- $\eta^2 = 0.010$ , fear:  $F_{(15,3,009)} = 2.577, p = 0.001$ , partial- $\eta^2 = 0.013$ , and anger:  $F_{(15,3,009)} = 2.067, p = 0.009$ , partial- $\eta^2 = 0.010$ ]. Further analysis indicated (Figure 2B) that different medical professionals had a similar downward trend of sadness, fear, and anger over time without significant difference.

## Relationship Between Negative Emotions and Risk Factors, Emotional Regulation, Avoidant Behavior Tendency, and Disturbed Physical Function

### The Sources of Negative Emotions

Supplementary Figure 1 shows that the shortage of protective supplies was the leading cause for all negative emotions. Specifically, the main sources for anxiety were possible infection without isolation, new confirmed cases, and possible infection without protection. The main sources for sadness were exhausted medical staff, helpless patients, and innocent people. The main sources for fear were possible infection without isolation, possible

infection without protection, and being infected by the virus. The main sources for anger were possible infection without isolation, possible infection without protection, and irresponsible rumors.

The Chi-squared test was conducted to compare the percentage of sources between different medical professionals, which (Supplementary Table 3) indicated that compared with doctors, nurses had higher rates of “shortage of protective supplies” [ $\chi^2_{(2,3,025)} = 10.121, p = 0.006$ ] and “new confirmed cases” [ $\chi^2_{(2,3,025)} = 39.266, p < 0.001$ ], which were sources of anxiety, as well as a higher percentage of “being infected by the virus” [ $\chi^2_{(2,3,025)} = 17.980, p < 0.001$ ], which was a main source of fear.

### The Impact of Risk Perception and Emotional Regulation Strategy on Negative Emotion

Figure 3 shows that medical staff answered “yes” for “this is a severe outbreak,” and had higher levels of anxiety [ $t_{(3,023)} = 2.980, p = 0.003$ , Cohen's  $d = 0.46$ ], sadness [ $t_{(3,023)} = 2.677, p = 0.007$ , Cohen's  $d = 0.42$ ], and fear [ $t_{(3,023)} = 4.455, p < 0.001$ , Cohen's  $d = 0.73$ ] compared with those medical staff who had no risk perception. Similarly, medical staff answered “yes” for “the epidemic is close to me,” and reported higher levels of anxiety [ $t_{(3,023)} = 2.945, p = 0.003$ , Cohen's  $d = 0.31$ ], sadness [ $t_{(3,023)} = 2.375, p = 0.018$ , Cohen's  $d = 0.26$ ], and fear [ $t_{(3,023)} = 4.073, p < 0.001$ , Cohen's  $d = 0.47$ ]. Moreover, medical staff answered “yes” for “I am in danger,” and reported higher levels of anxiety [ $t_{(3,023)} = 12.602, p < 0.001$ , Cohen's  $d = 0.70$ ], sadness [ $t_{(3,023)} = 8.536, p < 0.001$ , Cohen's  $d = 0.47$ ], fear [ $t_{(3,023)} = 13.567, p < 0.001$ , Cohen's  $d = 0.77$ ], and anger [ $t_{(3,023)} = 7.061, p < 0.001$ , Cohen's  $d = 0.41$ ].

Pearson correlation showed that (Table 1) cognitive reappraisal and expression suppression were negatively related to the levels of anxiety, fear, anger, and sadness ( $r = -0.049 \sim -0.137, p < 0.01$ ), while positive emotion expression, negative emotion expression, and impulse strength were positively correlated with negative emotions ( $r = 0.041 \sim 0.166, p < 0.05$ ).

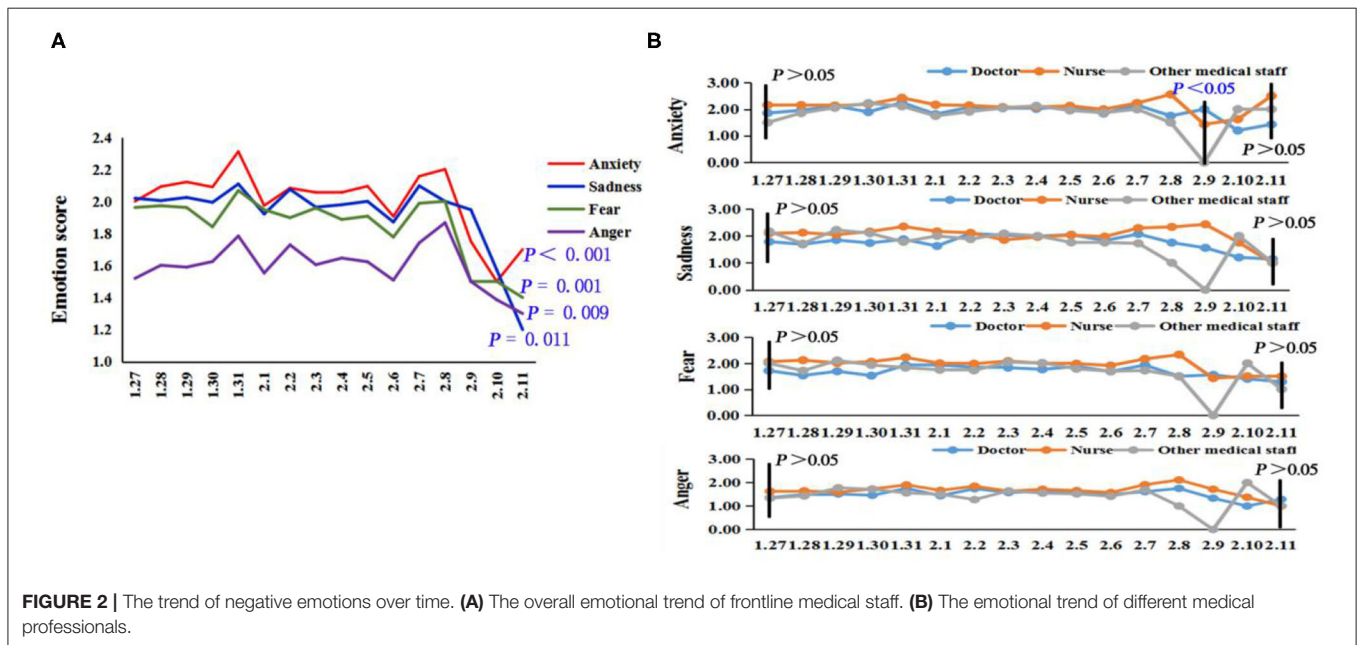
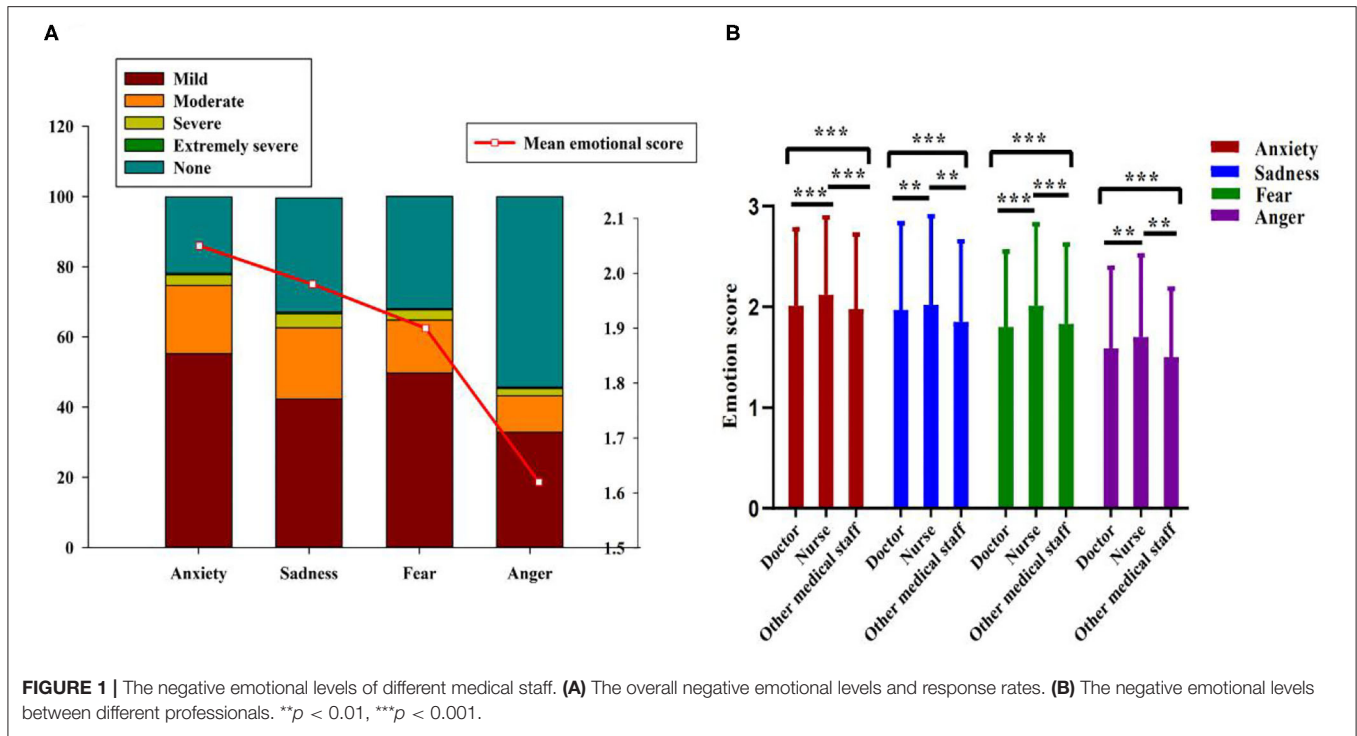
### The Effects of Negative Emotions on Avoidant Behavior Tendency and Disturbed Physical Function

Figure 4 indicates that negative emotions increased avoidant behavior tendency [ $\chi^2_{(4,3,025)} = 12.530 \sim 145.929$ , all  $p < 0.01$ ] and disturbed physical function [ $\chi^2_{(4,3,025)} = 46.331 \sim 319.721$ , all  $p < 0.001$ ] with increasing tendency as the enhancement of negative emotions (Supplementary Table 4).

## Emotional Models of Frontline Medical Staff

### Confirmatory Factor Analysis (CFA) Results

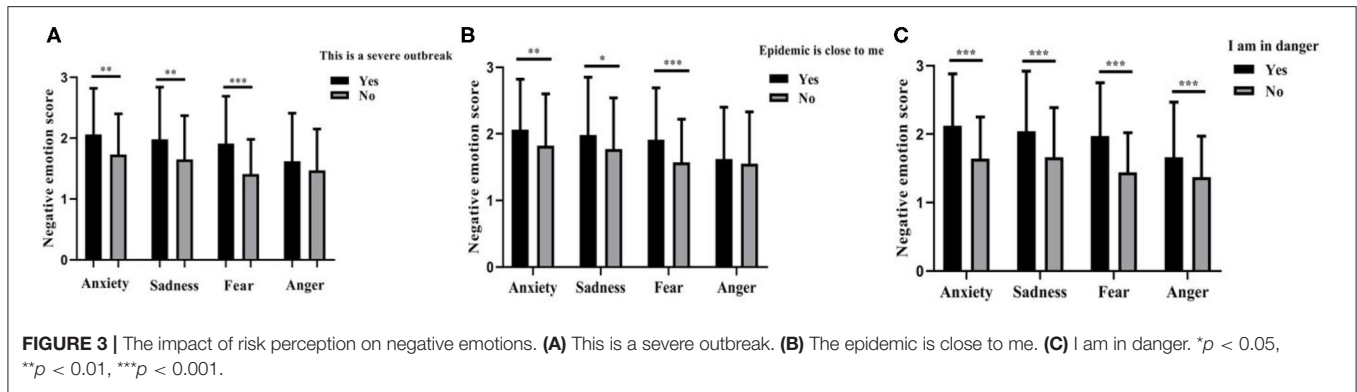
Supplementary Figure 2 shows that the CFA analysis on risk perception, disturbed physical function, and avoidant behavior tendency indicated an ideal model fit (46) ( $\chi^2 = 0$ ,  $df = 0$ , NFI = 1.000, IFI = 1.000, CFI = 1.000, RMSEA = 0.012  $\sim$  0.052), whereas the CFA coefficients of negative emotions also showed a satisfied model fit ( $\chi^2 = 4.998$ ,  $df = 1$ ,  $\chi^2/df = 4.998$ , NFI = 0.999, IFI = 0.999, CFI = 0.999, RMSEA = 0.005).



### Interaction Pathway Between Negative Emotions and Their Influential Factors

To further explore the interaction between negative emotions and risk perception, emotional regulation, avoidant behavior tendency, and disturbed physical function, a hypothesis-driven model test was carried out ( $\chi^2 = 57.986$ ,  $df = 9$ ,  $\chi^2/df = 6.443$ ,  $RMSEA = 0.042$ ,  $GFI = 0.995$ ,  $AGFI = 0.983$ ,  $NFI = 0.973$ ,  $IFI = 0.977$ ,  $TLI = 0.946$ ,  $CFI = 0.977$ ).

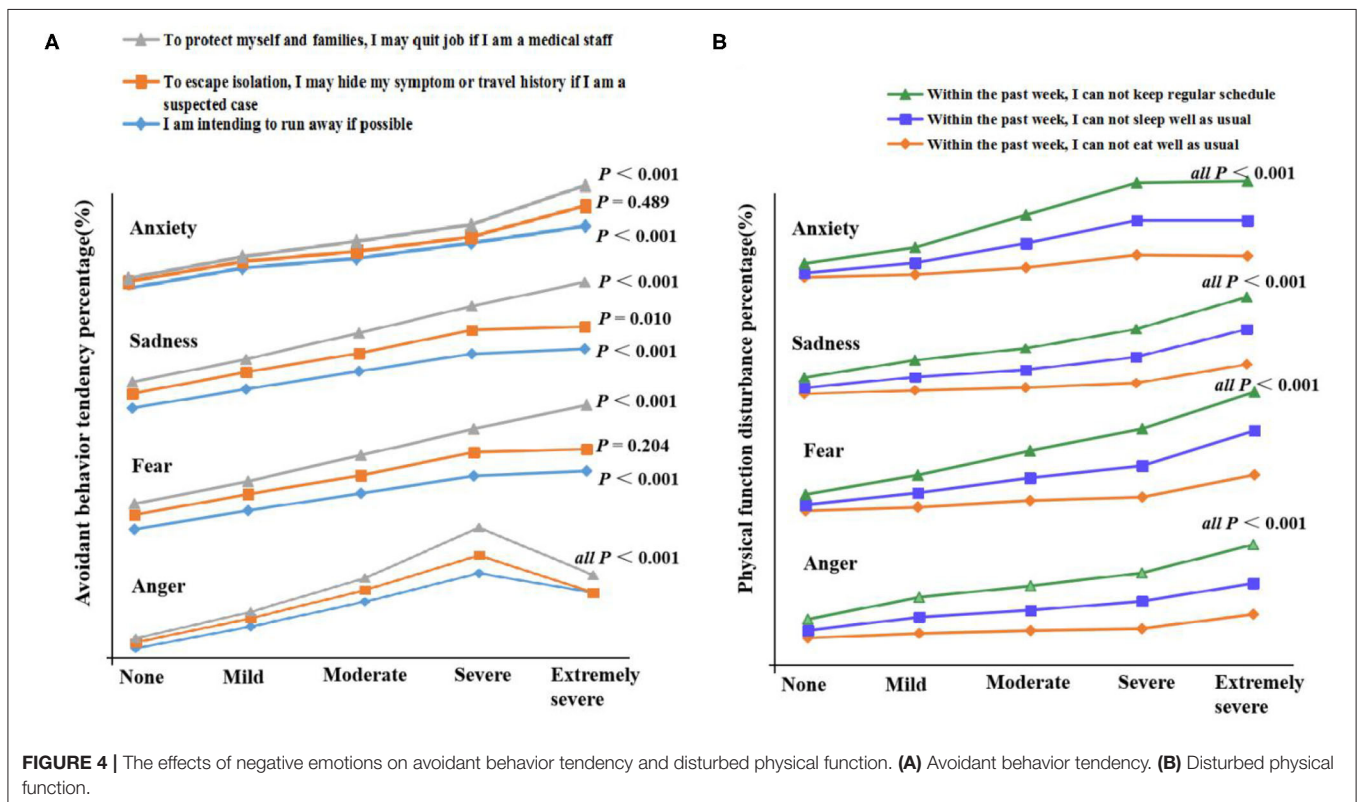
Figure 5 indicates that risk perception had a positive direct effect on negative emotion and avoidant behavior tendency, and an indirect effect on avoidant behavior tendency (0.029–0.048). Cognitive reappraisal had a negative effect while emotional expressivity had a positive effect on negative emotion. Negative emotion had a positive direct effect on avoidant behavior tendency and disturbed physical function, and an indirect effect on disturbed physical



**TABLE 1 |** Correlation between negative emotion and emotion regulation strategy.

	Cognitive reappraisal	Expressive suppression	Positive expressivity	Negative expressivity	Impulse strength
Anxiety	-0.076**	-0.049**	0.078**	0.139**	0.142**
Anger	-0.137**	-0.059**	0.084**	0.094**	0.151**
Sadness	-0.057**	-0.026	0.069**	0.132**	0.124**
Fear	-0.094**	-0.051**	0.096**	0.166**	0.148**

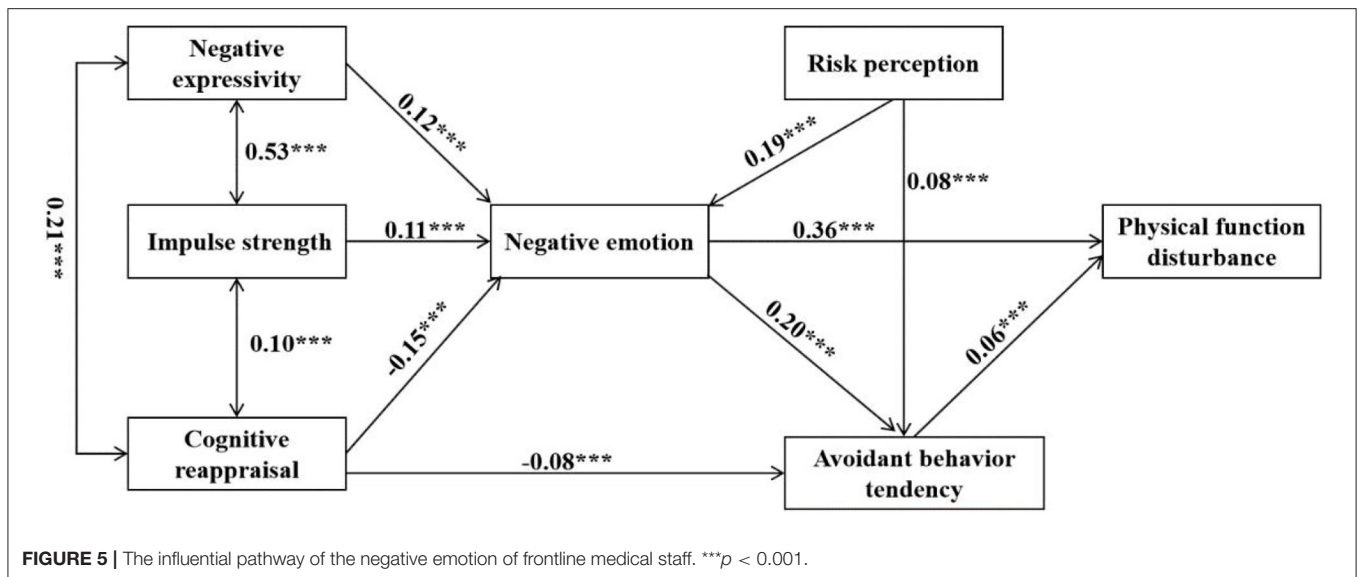
\*\* $p < 0.01$ .



function (0.005–0.02). The results indicated a positive effect between negative emotion and risk perception, avoidant behavior tendency, and disturbed physical function, in which negative emotion and avoidant behavior tendency played a mediation role.

Moreover, cognitive reappraisal reduced negative emotion ( $\beta = -0.15, p < 0.001$ ), and avoidant behavior tendency ( $\beta = -0.08, p < 0.001$ ), while impulse strength and negative expressivity increased negative emotion ( $\beta = 0.11, 0.12, p < 0.001$ ).





Multi-group analysis was conducted to verify the differences of models in three groups (doctors, nurses, and other medical staff). The result showed that there was no statistical difference in group comparisons ( $p = 0.367$ ), which indicated that the different roles of medical staff did not affect this model.

## DISCUSSION

In the current study, we explored the status, trend, and influential pattern of negative emotions in the Chinese frontline medical staff at the early stage of the COVID-19 epidemic *via* a nationwide investigation. Overall, we found that Chinese frontline medical staff experienced a mild level of negative emotions (i.e., fear, anxiety, anger, and sadness) in the early period of COVID-19, the trend of which decreased gradually over time. Additionally, nurses experienced a higher level of negative emotions, as well as women, younger, and unmarried medical staff. Risk perception and emotional expressivity increased negative emotions, cognitive reappraisal and expressive suppression reduced negative emotion, while negative emotions led to more avoidant behavior and more physical health disturbances, in which negative emotions mediated the effect of risk perception on avoidant behavior tendency and physical health disturbance of Chinese frontline medical staff.

### The Emotional Status of Frontline Medical Staff

The study revealed that Chinese frontline medical staff did experience different negative emotions, such as anxiety, sadness, fear, and anger. Among all the negative emotions, anxiety was the most common one for Chinese medical staff at the early stage of COVID-19. At the initial stage of COVID-19, it was normal for the public including frontline medical staff to experience negative emotions with the increasing

number of confirmed cases and deaths. Our finding was consistent with other studies (48, 49), which also revealed that medical staff experienced a higher level of anxiety during epidemics. For example, a multicenter survey (50) reported that the prevalence of anxiety was 44.7% in 1,563 Chinese medical workers fighting against COVID-19. Another study (20) also showed that frontline health professionals were highly vulnerable to experiencing physical exhaustion, fear, and emotion disturbance. Notably, in this study, four negative emotions were measured based on the TAS theory, while previous studies (5, 47) rarely investigated all the four negative emotions in one research. Thus, the findings suggested that psychological interventions and support should focus on relieving these primary negative emotions under crisis for frontline medical staff.

As to the degree of those negative emotions, medical staff only suffered from a mild degree even in the toughest period of fighting COVID-19, while the degree of negative emotions was rarely reported in other research. This might be due to the fact that Chinese medical staff had experienced the SARS epidemic in 2003 and they had been well prepared for the challenge of future epidemics ever since.

Among all the frontline medical staff, nurses reported the highest level of negative emotions compared with other medical professionals in our investigation, which was consistent with previous studies (22, 23). Nurses were more worried than doctors during the A/H1N1 influenza pandemic (22), and the overall level of distress was significantly higher than that of other medical staff during SARS (23). Nurses were regarded as the most vulnerable group among frontline medical staff due to their high exposure risk to the novel coronavirus compared with other medical professionals. For example, nurses were always at the frontline to screen suspected patients (51) and had close contacts with patients (52). Besides nurses, women, younger, and unmarried frontline medical staff also reported a higher level of negative emotions. Therefore, more attention should be

paid to maintain their psychological health under the current epidemic, and it is essential to support different kinds of medical staff differently.

### The Trend of Negative Emotions Over Time

The trend of negative emotions of Chinese frontline medical staff declined gradually as time went by, which was consistent with our hypothesis and previous findings (19, 25). However, according to one study conducted in Hong Kong in June 2003, researchers reported a relatively low level of distress in medical staff at the first stage of the epidemic, and they assumed that the level would be higher at the peak of the epidemic (23). Our result was inconsistent with their assumption. Two possible explanations for this finding: Firstly, the Chinese government played an active and productive role in the response to fighting against the epidemic, which enhanced medical staff's confidence toward the epidemic, and reduced their negative emotions effectively. Secondly, Chinese mental healthcare professionals provided psychological support for frontline medical staff in a timely and convenient manner (23), which guaranteed their mood effectively. The results suggested that along with the powerful executions of the government and epidemic control in China, medical staff's negative emotion decreased in a sense, which confirmed the effect of national epidemic control on public emotion. The finding also showed that psychological experts could provide psychological support at the beginning of an epidemic, which would be an important preventive measure to deal with the mental health problems of frontline medical staff.

### The Sources of Negative Emotions of Frontline Medical Staff

In this study, we found that the shortage of personal protective equipment (PPE) was the leading source of all negative emotions (i.e., fear, anxiety, anger, and sadness) of frontline medical staff at the early stage of the COVID-19 epidemic, which was also consistent with previous findings (13). Without standardized PPE, frontline medical staff were exposed to the higher risk of being infected with the virus. Besides, the potential infected individuals without quarantine and the suspected cases without protection were the main causes of anxiety, fear, and anger of frontline medical staff in this study, which was not previously reported. The results indicated that the quarantine and protection of suspected patients should be implemented strictly and effectively to reduce medical staff's psychological stress. Moreover, being infected by COVID-19 was also a primary source of fear among frontline medical staff. Thus, self-protection is of vital significance and much attention should be paid to train medical staff on how to use PPE before contacting patients (50). Our findings also showed that frontline medical staff felt sad about the existence of exhausted medical staff and severely infected patients. Together, results suggested that to reduce negative emotions of medical staff effectively, strategies should ensure PPE and implement protective procedures strictly and enhance therapeutic efficacy so that it might be most effective, which offers valuable evidence for the government.

### The Influential Effects Between Negative Emotions and Risk Perception, Avoidant Behavior, Physical Dysfunction, and Emotion Regulation

The findings confirmed that risk perception induced negative emotions of frontline medical staff significantly, which was consistent with the study (27) conducted during SARS. It showed that the level of fear elevated when people perceived a higher risk perception of the infectious disease (27). Therefore, reducing the risk perception of the epidemic may help healthcare workers reduce negative emotions. One systematic review of healthcare workers' perceptions of risk suggests that institutions need to ensure that appropriate infection control safeguards are in place to protect workers and their families (30). By doing so, negative emotions of medical staff are reduced effectively with lower risk perception.

Additionally, our findings showed the potential effect of negative emotion on personal avoidant behavior tendency, with the evidence of higher avoidant behavior tendency in medical staff with stronger negative emotion. Previous studies also found that some medical staff were reluctant to work or wanted to resign due to the fear of being infected or infecting their family members during the SARS epidemic (17, 33). The results suggested that reducing negative emotions may decrease the avoidant behavior tendency accordingly.

Besides, the findings also revealed the effect of negative emotion on personal disturbed physical function, with the evidence that a higher level of disturbed physical function in medical staff was related with a stronger level of negative emotion. The findings filled in the blank of previous empirical research between negative emotion and personal disturbed physical function, which also suggested that reducing negative emotions might decrease the physical function disturbance of frontline medical staff accordingly.

Moreover, the study innovatively verified the effect of emotion regulation strategy on negative emotion in the group of frontline medical staff during the early period of the COVID-19 epidemic. The findings showed that higher cognitive reappraisal and expressive suppression reduced the degree of negative emotions, while emotional expressivity increased negative emotions. The results indicate that the application of cognitive reappraisal and expressive suppression and less utilization of emotional expressivity may reduce negative emotions of frontline medical staff.

Together, risk perception induced negative emotions of frontline medical staff, emotion regulation strategies modulated negative emotions, and negative emotion had an effect on avoidant behavior tendency and disturbed physical function. The findings confirmed the TAS theory and further suggested the interaction between cognition, emotion, and behavior.

### The Pathway Between Negative Emotions and Their Influential Factors

The model test confirmed that risk perception increased negative emotion, which has been illustrated in a previous study (27). Moreover, emotional expressivity increased negative emotion,

cognitive reappraisal and expressive suppression decreased negative emotion, and negative emotion increased disturbed physical health, which were first verified in this study. Among which, negative emotion played an important mediation role between risk perception and avoidant behavior and disturbed physical function. Therefore, measures to reduce risk perception of frontline medical staff should be taken in a timely manner to decrease negative emotion and avoidant behavior at the early period of the COVID-19 epidemic. For example, training courses about the disease and treatment might be an effective way to minimize risk perception (53, 54). Meanwhile, to better maintain normal psychological and physical function under crisis, intervention and guidance on fear emotion are critical. We also found that avoidant behavior could directly influence disturbed physical function, filling the gap of existing knowledge. Thus, we can reduce negative emotions and avoidant behavior of frontline medical staff to promote their physical function by adopting interventions like cognitive-behavioral therapy (CBT) (55, 56). This knowledge helps to reveal an influential pattern between negative emotion and risk perception, emotion regulation strategy, avoidant behavior tendency, and physical function.

Importantly, negative emotions could be reduced through cognitive reappraisal and reduced risk perception, followed by decreased avoidance behavior and physical impairment. The findings provide a guide for psychologists to promote crisis intervention in the group of frontline medical staff during the COVID-19 epidemic, which further broadens the application of the TAS model.

The strengths of our study are as follows: firstly, the current study was one of the earliest nationwide and large population-based online surveys targeted at Chinese frontline medical staff fighting against COVID-19 from January 27 to February 11, 2020, which covered all 32 provincial administrative regions of China. Secondly, our study was a continuous trend survey of negative emotions of frontline medical staff at the early COVID-19 stage. We also explored the emotion status of different medical professionals, which might be potentially important to draw up psychological interventions for the targeted population under a public health crisis. Thirdly, we also explored the influential effects between negative emotions and risk perception, avoidant behavior, physical dysfunction, and emotion regulation among Chinese frontline medical staff, which could help provide emotion support more precisely and scientifically in the future.

Several limitations also exist in the study. First, only one question was designed to evaluate each kind of the four common negative emotions, and the study lacked more details about negative emotions of Chinese frontline medical staff fighting. Second, the data of other influential factors of emotions, such as coping styles and resilience, were not collected in the present study, and thus future research can explore more variables interacting with the emotions of frontline medical staff during epidemics. Moreover, despite the fact that numerous statistically significant results were found in the study, the effect sizes were rather weak. Some bias might exist due to the online data collection though it was a very convenient and effective way to do the online survey during COVID-19.

## CONCLUSION

In conclusion, Chinese frontline medical staff experience a mild level of negative emotions (i.e., fear, anxiety, anger, and sadness) at the early stage of COVID-19, which decreases gradually over time. Nurses report a higher level of negative emotions, as well as women, younger, and unmarried healthcare professionals. To better ensure the mental health of medical staff, reducing risk perception and improving cognitive reappraisal might be important, which would be potentially valuable to form targeted psychological intervention and emotional guidance under crisis in the future.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Human Research Ethics Committee of the Army Medical University of China. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

QD: research design, review, and supervision. XS: making questionnaires, data analysis, and writing original draft preparation. FX: review and editing. BC, PS, SS, ZC, YY, MZ, XQ, YL, and YW: data collection. All authors have read and agreed to the published version of the manuscript.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2021.567446/full#supplementary-material>



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# The Use of Big Data *via* 5G to Alleviate Symptoms of Acute Stress Disorder Caused by Quarantine Measures

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This article investigates the role of Big Data in situations of psychological stress such as during the recent pandemic caused by the COVID-19 health crisis. Quarantine measures, which are necessary to mitigate pandemic risk, are causing severe stress symptoms to the human body including mental health. We highlight the most common impact factors and the uncertainty connected with COVID-19, quarantine measures, and the role of Big Data, namely, how Big Data can help alleviate or mitigate these effects by comparing the *status quo* of current technology capabilities with the potential effects of an increase of digitalization on mental health. We find that, while Big Data helps in the pre-assessment of potentially endangered persons, it also proves to be an efficient tool in alleviating the negative psychological effects of quarantine. We find evidence of the positive effects of Big Data on human health conditions by assessing the effect of internet use on mental health in 173 countries. We found positive effects in 110 countries with 90 significant results. However, increased use of digital media and exclusive exposure to digital connectivity causes negative long-term effects such as a decline in social empathy, which creates a form of psychological isolation, causing symptoms of acute stress disorder.

**Keywords:** big data, psychological stress, quarantine, COVID-19, mental health, 5G

## INTRODUCTION

During the ongoing COVID-19 pandemic many countries have introduced measures to manage and mitigate the risk of the virus spreading. People have been exposed to conditions of severe uncertainty in relation to case fatality rates, the spread of the virus, and the costs of risk mitigation measures. The impact of this uncertainty is connected to morbidity, mortality, and risk, and has resulted in increased levels of panic and anxiety across almost all societies.

Previous disease outbreaks such as SARS or Ebola have shown that anxiety can appear in a community as the result of many factors such as death and the number of new cases reported frequently by media (Rubin and Wessely, 2020). However, the recent COVID-19 outbreak caused drastic measures to be taken by governments globally, e.g., imposing stay-at-home orders. These dramatic measures increased the level of anxiety because they interfered with the natural desire

and necessity of people to socially interact with other people. Generally, quarantine implies a lack of control and a sense of being trapped, which is intensified when families are isolated (Rubin and Wessely, 2020). There is sufficient evidence that quarantine can cause substantial psychological, emotional, and financial challenges. To be more effective, quarantine requires the person at risk to be isolated and follow proper infection-control steps within the quarantine area (Hawryluck et al., 2004). Moreover, self-isolation can lead to severe symptoms of acute stress disorder (ASD) (Brooks et al., 2020).

The impact of quarantine measures was studied extensively in relation to pandemics such as SARS or Ebola. Various interviews and surveys among those who experienced the quarantine measures revealed that the impact on mental and psychological health can be enormous including isolation and separation, post-traumatic stress, depression, avoidance behavior, irritation, sadness, annoyance, anxiety, frustration, guilt, helplessness, loneliness, and nervousness. The quarantine measures can also lead to symptoms of ASD, which is characterized by panic and anxiety, and stigmatization, even following social isolation. The major difference of the current situation in comparison to the SARS or Ebola pandemics is the role of social media. Through social media various fake news, rumors and misinformation was spread which further increased the negative impact and the levels of anxiety. This is also defined as digital stress, caused by a huge variety of communication channels and contradictory information. The COVID-19 crisis showed a correlation between psychological consequences and the utilization of digital media.

Big Data is a comparatively new discipline of data science that investigates how massive data sets can be interpreted to harvest significant insights and information. It is worth mentioning that traditional data processing methods/approaches are not suitable for gathering, warehousing, and the analysis of big data. The five V's of big data (velocity, volume, value, variety, and veracity) are the five primary and innate characteristics of Big Data (for more information, see, for example, Hassani et al. (2019a,b, 2020, 2021).

So-called "Big Data" have significant potentials for the health sector as it can help monitor the spread of disease. They can also help to increase the quality of medical services. Big Data can also help to create transparent information for people, and this helps to alleviate some of the most negative impacts on mental health such as anxiety and uncertainty, which leads to additional stress.

The deployment of Big Data will benefit from the introduction of 5G technology, which will connect more than 50 billion people and will allow the analysis of a much larger percentage of digital data than before. The 5G network also enables the transmission of Big Data in real time, including up-to-date diagnostics. The health sector welcomes the deployment of 5G, as this technology will benefit from the features of high-speed networks by reducing the time required to analyze large amounts of data.

Influenced by mobility restrictions, people in quarantine use digital channels of communication much more frequently to compensate for the restricted mobility. During the pandemic, this resulted in a greater volume of Big Data being generated during quarantine. This is on the one hand a chance for further

data analysis, but on the other, personal data protection, and the appropriate storage of data should be considered.

The usage of the Big Data approach in health systems is still minimal. This paper discusses the sustainable use of Big Data with the application of 5G technology, concerning data protection issues. Such usage can be beneficial in the health sector and could help to address the negative impacts on mental health that have arisen after quarantine measures. The paper discusses the benefits of 5G technology, such as increased speeds of data transmission and how they can be beneficial for the health sector and calls for further research in this area to understand all consequences of the implementation of 5G technology.

## COMMON SYMPTOMS CAUSED BY QUARANTINE

Quarantine is critical for managing infectious diseases, and may be successful from an epidemiological perspective to control exposure to infection. However, it has some side effects. It has a dramatic effect on the finances, emotions, and psychology of the people who have had to stay at home completely (Brooks et al., 2020). A review of related articles shows that psychological stress is one of the critical negative consequences of quarantine. Emotional disturbance, depression, low mood, irritability, and insomnia have been seen repetitively (Hawryluck et al., 2004; Brooks et al., 2020). It has been confirmed that the increased duration of quarantine is associated with growing post-traumatic stress disorder (PTSD) and ASD. PTSD and ASD are anxiety disorders with long-term psychiatric morbidity. From a psychological point of view, PTSD is developed by someone who experienced a life-threatening event. It can be recognized by some criteria, such as increased vigilance and heart beating (Bryant, 2017). Some evidence indicates that post-traumatic stress can increase significantly in more than a 10-day quarantine. Moreover, ASD is identified by PTSD symptoms, which occur early after trauma. It could be a short-term side effect of staying completely at home. ASD can lead to anxiety, insomnia, poor concentration, and exhaustion. As a result of this problem, the number of people who changed careers, relocated for work, and/or considered resigning has increased (Brooks et al., 2020). In one study, 87.4 percent of people who stayed at home reported psychological and corporeal distress after the outbreak (Lee et al., 2005).

Fear is a common emotion experienced by most people in quarantine, fear for their health, or fear of infecting others. People quarantined often experienced a lack of communication, even with their family members. As a result, depression and low mood have been reported in some studies. One qualified study about the psychological effect of SARS quarantine in Toronto showed that symptoms of depression were observed in about 31.2 percent and in this study, the presence of depressive symptoms was highly correlated with PTSD symptoms (Hawryluck et al., 2004). In the December 2019 outbreak, most of the countries around the world applied quarantine once again for reducing the spread of the disease managing better of the COVID-19 pandemic.

According to WHO technical guidance notes about COVID-19 “the main psychological impact to date is elevated rates of stress or anxiety, as new measures and impacts are introduced (especially quarantine and its effects on many people’s usual activities, routines or livelihoods) levels of loneliness, depression, harmful alcohol, and drug use, and self-harm or suicidal behavior are also expected to rise” (CDC Covid-19 Response Team, 2020). Some other articles provide scientific evidence about similar negative consequences caused by quarantine. These articles outline a tremendous increase in frustration, boredom, and distress reactions such as rage and rigid fear of getting illness even in those not exposed (Caleo et al., 2018) and lasting impact on health-risk behaviors, for instance, overuse of tobacco and alcohol. With increased numbers of people experiencing social isolation, people may experience stigmatization (Pan et al., 2005; Ćosić et al., 2020).

A significant number of scientific works exist about the impact of quarantine on mental and psychological health. These studies focused on the impacts of Ebola, SARS, and other diseases. There were also various studies on the impact of quarantine, mainly because of SARS, on the mental health of inhabitants in different countries such as Taiwan (Bai et al., 2004), China (Mihashi et al., 2009), Hong Kong (Lee et al., 2005), and South Korea (Jeong et al., 2016), but also the United States (Sprang and Silman, 2013), Canada (Blendon et al., 2004), and Australia (Braunack-Mayer et al., 2013). Many studies have identified the impact of quarantine measures on mental health, because of the Ebola pandemic in Liberia (Pellecchia et al., 2015) and Sierra Leone (Caleo et al., 2018).

Many of these studies examine the impact of quarantine measures on various social groups. For instance, a study that compared post-traumatic stress symptoms among parents and children found that children who were in quarantine had four times more frequent post-traumatic stress symptoms than children who were not in quarantine. A significant share of parents (28%) showed symptoms of trauma-related mental health disorders in comparison to a less significant (6%) share of parents who were not in quarantine (Sprang and Silman, 2013). Another study identified the impact of quarantine measures on hospital workers. It found that a significant share of workers showed symptoms of depression even 3 years after the event. In total, 60% of workers who showed depressive symptoms also experienced quarantine measures (Liu et al., 2012). Another study found that people who were quarantined because they were in close contact with people who had infectious diseases experienced fear (20%), nervousness (18%), sadness (18%), and guilt (10%). Positive feelings such as happiness (5%) or feelings of relief (4%) were reported in fewer studies (Reynolds et al., 2008).

Only a few studies have conducted correlation analysis of the impact of quarantine measures on mental health dependent on demographic variables such as marital status, age, education, living with other adults, or having children. However, no significant evidence of the correlations between these variables was found (Hawryluck et al., 2004). Two variables had a significant influence on mental health, such as professional occupation and previous psychological

sicknesses (Jeong et al., 2016). For instance, among those who have been quarantined, health workers have more severe symptoms of post-traumatic stress syndrome than the general public. Furthermore, quarantined workers feel more anger, annoyance, fear, frustration, guilt, helplessness, isolation, loneliness, and nervousness. They are also more likely to think that they have an infection and that they will infect others (Robertson et al., 2004).

A number of studies have identified correlations between a negative impact on mental health and factors such as the duration of quarantine, fear of infection, frustration and boredom, and inadequate supply and information. Longer durations of quarantine resulted in more frequent post-traumatic syndromes, avoidance behavior, and anger (Marjanovic et al., 2007). The negative impacts of quarantine were significantly higher if the duration of the measures was longer than 10 days (Hawryluck et al., 2004). Some studies found correlations between fears and factors such as having young children or expecting children or being physically vulnerable physically (Desclaux et al., 2017). There was also a correlation between how strongly the daily routine was affected, the reduction of social contact, and feelings of boredom and frustration (Blendon et al., 2004). The inadequate supply during quarantine, such as the delivery of medical items, food, water, or groceries, was strongly connected with feelings of anxiety and anger, which were present even several months after the release of quarantine measures (Wilken et al., 2017). Inadequate, confusing, or contradictory information about the pandemic or necessary actions was cited as one of the main stress factors (Braunack-Mayer et al., 2013). Often the various messages, differences in style, approaches, and content used by various public institutions were perceived as stress factors (DiGiovanni et al., 2004). Lack of clarity about the risk and its seriousness significantly influenced risk perceptions (Desclaux et al., 2017). Perceived lack of transparency from public authorities about the severity of pandemics also influenced risk perceptions (Braunack-Mayer et al., 2013). Lack of clear guidelines and perceived difficulties in coping with quarantine measures contributed significantly to the development of post-traumatic stress symptoms (Reynolds et al., 2008).

The main difference to the situation of today is that the role of social media during the earlier Ebola and other pandemics was not as significant. Social media make the spread of information much faster and almost universal as almost everybody has access to social media. Together with various kinds of messages and news, social media are also spreading misinformation or in some cases even disinformation. Existing widespread information, a great number of rumors, fake news, and conspiracy stories in conditions of high uncertainty and high impact on human life is creating further negative impacts on mental and psychological health, in addition to the already stressful situation. This situation also adds to the effects described above, including anxiety and various psychological disorders. Negative perceptions of quarantine measures can also be influenced by social media and are connected with factors such as perceived loss of freedom, uncertainty over disease status, and boredom. These factors can lead to feelings including irritation or depression or even to dramatic consequences such as suicide.



## HOW BIG DATA CAN HELP ALLEVIATING STRESS SYMPTOMS

We are now living in an era of “Big Data” marked by significant growth and an exponential rate of data generation. This fact creates a huge opportunity for public health in finding possible patterns and trends across populations and possibly foretelling disease outbreaks based on powerful search engine results combined with a huge data warehouse and analytics. For instance, using API information, and geographic location to identify disease transmission, combined with other auxiliary information such as analyzing posts on Twitter could lead to promising results (Rosen et al., 2020). By analyzing people’s data in quarantine, we can recognize the main problems, and possibly find a solution. Improving the level of public health is a vital aim for all countries, so by using data, we can achieve this aim. People in quarantine have used digital media more than usual. They have tried to catch more information about their worries. Lack of education and having false information leads to increased psychological problems.

An important factor is the availability of a standard instrument. For instance, based on collected data, this could be a survey that reflects the full spectrum of psychological aspects of quarantine and useful approaches to overcoming many related issues. Such an instrument would be extremely useful for possible outbreaks in the future. A standardized instrument facilitates a connection and probable correlation between the psychological responses to outbreaks for various infectious causes and also could be utilized to control symptoms over time (Hawryluck et al., 2004). Categorizing these data would provide a guideline for managing public health problems as well as alleviating stress symptoms during the quarantine. It should be noted that although employing the Big Data approach for public health intervention is still very minimal, with growing data convergence, impressive analytic power, and the broad range of applications and its success, one expects Big Data and smart techniques to become one of the increasingly common prime choices (Rosen et al., 2020).

Belle et al. (2015) indicated two devices that are available everywhere and continuously generated data and information; telemetry and physiological signal monitoring devices. However, data and information generated from these devices have not been deposited, as would be expected during this age of technology. Nevertheless, there have been some efforts toward collecting, depositing, employing, and analyzing telemetry and continuous physiological extracted signals and data from monitoring to improving patient care and management (see, for example, Mackenzie et al., 2008; Apiletti et al., 2009; Bodo et al., 2013; Hu et al., 2014).

The computational aspect of Big Data aids the health care system and organizations across the globe to have real-time decision-making. This enables them to enhance and advance the quality of healthcare services as well as cost reduction (Ta et al., 2016).

It is important to consider the compatibility of front-end as well as back-end systems. While certain environments run on different operating systems, the devices that gather the data and

send it to be stored (i.e., on clouds) might run on different systems. This incompatibility might cause delays or inefficiencies in the transmission process. It might also lead to misleading analytics or even system crashes.

There are various applications of Big Data and its related techniques for tackling fundamental issues and trends in healthcare analytics research, with various applications ranging from text mining and predictive modeling to pattern and face recognition (Sun and Reddy, 2013).

One psychological factor of how Big Data can help alleviate stress symptoms during a pandemic is through the creation of transparent information for affected people. A very significant factor adding to stress is uncertainty. During a pandemic, quarantined people have a lot of time due to the imposed restrictions. However, this suddenly gained time might turn into stress when people are confronted with an indefinite course of the measures taken by authorities, as well as contradictions in the health statistics published. The data generated through surveillance tracing, health statistics, and reports can help people to alleviate these kinds of stress symptoms, enabling them to stay informed.

As well as creating more accurate information on the current status of the pandemic, Big Data can create better predictions about the future of the outbreak (Bansal et al., 2016).

To test how Big Data can help to improve health conditions we first want to give an overview of the existing literature in this area. As a proxy for Big Data, we relate general internet usage to the generation and use of Big Data. It, therefore, makes sense to take a closer look at health studies conducted since the emergence of the internet, since this time frame covers a regime change that potentially reveals changes in health-related conditions. An obvious way in which Big Data and the internet were and continue to be used was to look up potential diagnoses and treatments for certain health problems. Trotter and Morgan (2008) study internet usage in 2000 and 2006 for health related information. Through a survey, they found a significant increase in looking up health related information on the internet.

Several studies have been conducted to investigate the introduction of 5G and data provision. A recent study by Rizzato (2020) estimates that 5G users on average consume up to 2.7 times more mobile data compared to 4G users. The study comprised six countries: South Korea, United Kingdom, Japan, United States, Australia, and Germany, and found an average consumption of 15GB of mobile data for 5G users. By estimating the effect of regular internet usage, which is assumed to be mainly based on 4G, on mental health, we can therefore deduct the potential effect of the introduction of 5G on improving health conditions.

A white paper by Cisco (2020) indicates that nearly two-thirds of the global population will have internet access by 2023. They also outline that over 70 percent of the global population will have mobile connectivity by 2023 and that 5G devices and these connections will account for over 10 percent of global mobile devices and connections by 2023. Another study by Cisco (2016) found that more than 500 billion Internet of Things (IoT) devices, from sensors to actuators, to medical devices, will be connected to the internet by 2030.

In a survey, Pew Research Center (2018) found that 95 percent of Americans own a cell phone and 77 percent have smartphones, whereas, for low-income segments of the population, including those in African-American and Hispanic communities, wireless connectivity is most likely their only online access (Turner Lee, 2019).

Turner Lee (2019) also mentions the importance of 5G for health care services. This is because 5G and IoT are broadly applied to life-saving devices and other applications in health care where it is “*imperative that they operate as anticipated, without fail, every time.*” Lee further mentions significant examples of the importance of the 5G applications for health such as home health sensing, which is a critical intervention for chronic disease patients that uses microphones in smartphones to replicate spirometers, which measure the airflow in and out of lungs for patients with chronic obstructive pulmonary disease (COPD). The data collected is used by doctors to monitor the disease’s progression in patients in real-time (Turner Lee, 2019).

Another important application of 5G, and internet usage, is among pregnant women seeking health information. Javanmardi et al. (2018) conducted a review study of 16 articles and found that the use of the internet by pregnant women was driven by information needs, ease, and speed of access, and finding people with the same situation. The article shows the importance of accessibility and speed provided by 5G.

Ducrot et al. (2021) analyze and describe the evolution of internet use as a source of health information between 2010 and 2017 and found that the use of the internet as a source of health information rose between 2010 and 2014 (from 37.3 to 67.9%,  $P < 0.001$ ) but decreased significantly in 2017 (60.3%,  $P < 0.001$ ). They outline that the reason for the recent decrease in internet usage was the parallel decrease in trust in the quality and reliability of information found online. The authors stress the need for public health authorities to increase citizens’ eHealth literacy and to provide alternative trustworthy sources combining the popularity and accessibility of general health information websites. Their results highlight the importance of 5G to enable patients a quicker verification of health information found online.

## DATA AND POTENTIAL ANALYSIS

To show the potential of 5G to alleviate stress symptoms, and thus, to improve mental health conditions we tested the impact of global internet usage in each country on its population health condition. For this purpose, we took telecommunication network usage as a proxy and individuals using the internet in % of the population (Worldbank, 2021) and for the measurement of mental health the Disability-Adjusted Life Years (DALYs), which considers not only the mortality associated with a disorder but also years lived with disability or health burden (Ourworldindata, 2021).

Our sample size comprises 173 countries for which we found available data from Worldbank. We took yearly data from 1990 to 2019 for each country,  $k$ , and regress the annual changes of DALYs on the percentage of the population of country  $k$  using

the internet,  $INT$ ,

$$DALY_k(t) = \alpha_k + \beta_k INT_k(t) + \epsilon_t, \quad (1)$$

for all countries,  $k = 1, \dots, 173$ . We assume that, as discussed above, broader usage of the internet leads to an alleviation effect of stress symptoms, causing an improvement of mental health in the long-run.

By estimating these parameters we are able to deduct what impact the average increase in internet usage will have on the mental health of a population.

## RESULTS

The results show that a significant amount of countries exhibit a negative beta, which means that an increase in internet usage improves mental health conditions. For most of the countries, we found a significant reduction of a population’s share of the total disease burden. In detail, as reported in **Supplementary material Appendix**, out of 173 countries we found that 90 have significant results ( $P < 0.10$ ), 73 countries highly significant ( $P < 0.05$ ), and 110 countries had a negative beta, meaning that 63.58% of the analyzed countries show a positive impact of increased internet usage on mental health.

When looking at continents, we classify the countries into 6 regions: North America, South America, Arabia, Asia/South Pacific, Europe, and Africa. When analyzing the relative share of countries with a negative beta to the total number of countries in the region, and the level of significance, we found the following results.

**Table 1** provides an overview of the relative amount of countries that exhibit a negative beta, compared to the total number of countries in that region. We can see that North America leads by far in terms of the positive effect of internet usage on mental health, followed by South America, the Arabic region, Asia/South Pacific, Europe, and Africa. The reason for Africa coming last might be under-developed internet access and infrastructure, respectively, and awareness of the population of the positive effect of internet usage on their health condition.

The results also indicate the relative share of countries for which we found the negative beta to be significant ( $P < 0.05$ ). We found that the Arabic region yielded the most significant results, followed by the African continent, South and North America, Asia/South Pacific, and finally Europe. The reason for Arabia and Africa having the majority of significant results might

**TABLE 1** | Relative share of countries with a negative beta to the total number of countries in each region, ranked, including the relative amount of significant results in each region.

Negative Beta			Significant ( $P < 0.05$ )		
1.	100%	North America	1.	63.64%	Arabia
2.	89.29%	South America	2.	53.85%	Africa
3.	81.82%	Arabia	3.	53.57%	South America
4.	78.95%	Asia/South Pacific	4.	50.00%	North America
5.	72.50%	Europe	5.	31.58%	Asia/South Pacific
6.	30.77%	Africa	6.	25.00%	Europe

**TABLE 2** | Summary table of G20 DALY mental health condition of population regressed on internet usage per country population from 1990 to 2019.

	Intercept	Beta	P-value	R <sup>2</sup>
Germany	0.0129273	-0.019027	4.21E-05***	0.495244
United States	0.0103237	-0.018925	0.00655***	0.260299
Australia	0.0108802	-0.014969	0.009383***	0.240627
Canada	0.0024749	-0.00637	0.085847*	0.113418
Saudi Arabia	0.0372408	-0.040256	5.75E-07***	0.721396
India	0.0235893	-0.005949	0.80903	0.002482
Russia	-0.013848	0.0489164	0.093026*	0.108727
South Africa	-0.024372	0.1929178	9.29E-06***	0.551068
Turkey	0.0362545	-0.059203	0.003692**	0.312225
Argentina	0.0094602	-0.007786	0.314633	0.042102
Brazil	0.0299709	-0.062219	4.68E-09***	0.752717
Mexico	0.0242918	-0.065685	2.94E-05***	0.50913
France	0.0042269	-0.002129	0.588921	0.011846
Italy	-0.000274	0.007386	0.336082	0.037054
United Kingdom	0.0109992	-0.009687	0.025947**	0.183165
China	0.0277782	-0.069235	1.17E-08***	0.763534
Indonesia	0.019823	-0.02437	0.770124	0.003963
Japan	-0.00697	0.0039311	0.464696	0.021577
South Korea	0.0157814	-0.011671	0.000771***	0.369465
EU	0.006929	-0.00761	0.023468**	0.188941

Significant codes: 0 - \*\*\*0.001, \*\*0.05, \*0.10; 1.

lie in the growth rates of internet usage in these countries. The average internet usage growth rate per year of 56% in Arabic countries, and the average yearly growth rate in Europe is less, at around 40%.

To illustrate these results we further analyzed 20 countries and found that 13 out of 20 showed significant results.

**Table 2** shows the test results for the G20 countries, analyzing the impact of internet usage per population on the mental health condition of the corresponding country. Out of the 20 countries, we found that 17 countries had a negative beta. The only exceptions are Japan, Italy, and Russia, which exhibit a negative intercept, implying an already high degree of internet usage for these populations in general. However, the test results of these countries are not significant and exhibit a very low R<sup>2</sup>.

The test result shows that an extension of the internet and data transmission capacity, i.e., through the upgrade from 4G to 5G, has the potential to improve the mental health conditions of the populations in the countries where better accessibility and faster broadband is being established. This article will next discuss the potential role of 5G in a mental health crisis in detail.

## THE POTENTIAL ROLE OF 5G IN A MENTAL HEALTH CRISIS

In telecommunication terminology, 5G is defined as the fifth-generation technology standard for cellular networks and is considered as the next generation of 4G networks (which currently provide connectivity to most cellphones). One of the notable advantages of 5G networks is that they provide greater bandwidth and faster download speeds.

It is worth mentioning that 5G is not just an extension of 3G and 4G, rather, it involves a mixed network combining 4G, Wi-Fi, millimeter-wave, as well as many other wireless access technologies. It explores and derives a deeper aspect from the data/information/signal extracted by a significant number of devices by integrating cloud infrastructure, a virtualized network core, intelligent edge services, and a distributed computing model. In terms of frequency bands, 5G utilizes high-frequency bands around and higher than 60,000 MHz whilst the majority of current mobile (cellular) communications utilize below the 3.5 MHz range. Generally, four factors can be considered as main factors to distinguish 5G from its predecessors: connected devices, fast and intelligent networks, back-end services, and extremely low latency. As such enhanced mobile broadband, machine-to-machine communications, artificial intelligence, and advanced digital services of 5G are increasingly employed in the medical sector (West, 2016).

It is expected that the 5G network will be deployed to connect 50 billion devices and 212 billion sensors in 2020. This will include smartphones, tablets, smartwatches, cars, machinery, appliances, and remote monitoring devices, and many others (King, 2016). Accordingly, a huge amount of valuable data will be generated and provide a golden opportunity to extract useful information. It is expected that 5G as a connected ecosystem empowers us to use a more substantial percentage of digital data (35%) than previously (5%) (Davis, 2017).

During a quarantine, symptoms of ASD are likely to occur. It is characterized by anxiety and panic, particularly stigmatization and social isolation of confirmed cases, survivors, and relations, which may escalate into further negative psychological reactions, including adjustment disorder and depression (Kinsman, 2012). During the epidemic, rapid, integration can maximize effective management of the psychological crisis. Psychological crisis intervention should be dynamic, adapted to setting different stages of the epidemic, i.e., during and after the outbreak. During the outbreak, mental health professionals should actively participate in the overall intervention process in the disease, so that the mental health and psychosocial response can be mobilized in a timely fashion (Mohammed et al., 2015). With the support for remote psychological intervention provided by the development of internet technology, especially the widespread application of 4G or 5G networks and smartphones, the new intervention model was developed to handle the present COVID-19 public health event (Zhang et al., 2020). Nevertheless, some evidence suggests that there is a correlation between psychological consequences and the utilization of digital media. Digital stress, which is defined as stress caused by negative interactions in emails, texts, social media, chat rooms, and forums, is an essential intervening factor (Steele et al., 2020).

There is an indication that digital media increase the perception of our communities and activities (**Table 3**). The association between digital media and stress is indirect. The increase in digital media usage is undoubtedly related to alterations in the structure of humans' life (Hampton et al., 2016).

To analyze the potential role of 5G in a mental health crisis, one first needs to distinguish between the role of 5G in diagnostics and treatment. For instance, EMC in the context of 5G offers



**TABLE 3 |** 4G download speed reduction during COVID-19 pandemic across Asia, Europe, the Middle East, Africa, South, and Central America, and North America on a weekly basis between the last week of January and the fourth week of March (January 27 to March 29), (Opensignal, 2020).

**Mobile Experience during the COVID-19 pandemic: 4G Download Speed (Mbps)**

OPENSIGNAL		27 Jan. - 2 Feb.	3 Feb. - 9 Feb.	10 Feb. - 16 Feb.	17 Feb. - 23 Feb.	24 Feb. - 1 Mar.	-2 Mar. - 8 Mar.	9 Mar. - 15 Mar.	16 Mar. - 22 Mar.	23 Mar. - 29 Mar.	
		Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	
<b>ASIA</b>											
Australia	46.7	46.3	46.0	46.2	45.6	45.1	44.3	44.8	43.1		
Bangladesh	9.3	9.5	9.2	9.0	9.1	9.0	8.9	8.4	7.8		
Cambodia	9.2	9.2	9.7	9.7	9.5	9.2	9.1	8.9	8.3		
Hong Kong	23.5	22.1	23.1	23.3	23.9	22.7	21.6	22.7	21.7		
Indonesia	11.7	11.9	11.6	11.5	11.6	11.5	11.4	10.6	10.0		
Japan	49.1	49.9	49.5	49.2	48.5	48.2	47.9	48.7	48.0		
Malaysia	13.4	13.7	13.4	13.5	13.4	13.4	13.4	13.3	10.1	8.8	
Myanmar	18.8	19.6	19.0	20.1	19.8	19.9	18.7	18.4	17.6		
Pakistan	11.7	12.1	12.0	11.9	11.7	11.4	11.2	11.2	10.1		
Singapore	55.5	53.1	53.9	54.8	54.3	52.5	51.7	50.0	50.6		
South Korea	51.5	55.1	53.8	52.0	50.9	55.6	53.9	52.8	52.1		
Sri Lanka	14.4	14.1	14.1	13.3	13.4	13.2	13.1	9.7	9.9		
Taiwan	30.6	31.4	30.2	31.2	30.0	30.6	30.5	29.9	29.3		
Thailand	11.3	11.6	11.4	11.7	11.6	11.2	10.3	10.0	9.3		
Vietnam	29.2	26.6	25.7	25.7	24.9	25.8	27.6	26.6	28.0		
<b>EMEA</b>											
Belgium	40.6	38.9	40.4	40.1	39.2	39.0	37.0	38.9	39.2		
Bulgaria	42.2	41.9	41.7	40.8	39.3	40.3	40.5	40.0	38.4		
Egypt	15.8	15.7	15.1	15.6	14.6	14.5	13.7	14.9	14.1		
Germany	30.1	30.4	30.2	29.9	30.1	29.9	29.7	30.2	30.3		
Ireland	27.3	27.5	26.2	26.7	27.5	27.0	26.3	23.3	24.0		
Italy	28.1	27.9	28.6	29.2	28.8	28.1	25.2	23.7	23.6		
Netherlands	58.6	57.9	55.5	58.2	57.7	55.7	56.3	57.9	58.9		
Portugal	30.4	29.8	29.3	30.2	30.1	28.7	28.8	27.3	27.9		
Qatar	42.9	42.8	38.3	37.8	37.5	39.2	35.4	31.5	30.4		
Romania	24.6	24.8	25.6	24.4	24.4	24.5	24.8	24.7	24.5		
Saudi Arabia	26.7	26.7	26.9	27.2	27.6	26.1	24.3	23.6	22.2		
South Africa	24.9	24.0	25.5	25.3	24.7	24.6	23.1	23.7	22.0		
Spain	28.6	29.4	30.1	29.5	28.9	29.1	29.0	27.0	27.6		
Switzerland	46.3	47.6	45.8	46.2	45.8	44.4	43.8	42.0	42.8		
UAE	39.2	39.8	41.0	40.5	39.5	39.2	36.2	38.7	35.6		
UK	25.7	26.1	25.6	25.0	25.0	24.5	23.8	24.3	18.3		
<b>SOUTH AND CENTRAL AMERICA</b>											
Argentina	20.3	19.7	20.0	19.5	19.8	19.6	19.1	19.5	19.7		
Brazil	19.4	19.1	19.1	18.8	19.5	19.0	19.2	19.2	19.7		
Chile	16.6	16.7	16.3	16.1	15.7	15.8	15.9	14.1	13.6		
Colombia	17.8	17.5	17.7	17.1	17.5	17.6	17.2	16.9	16.9		
Costa Rica	20.0	19.6	18.0	19.5	19.2	19.6	17.7	18.4	19.2		
Ecuador	21.4	21.4	20.7	20.5	20.5	20.1	20.0	19.1	17.9		
Peru	14.9	15.1	15.2	15.2	15.3	15.1	14.9	11.5	12.2		
Uruguay	24.7	25.1	25.2	24.2	25.0	24.6	24.2	23.4	23.6		
<b>NORTH AMERICA</b>											
Canada	62.8	63.7	63.8	63.6	62.7	63.2	62.5	62.8	61.6		
Mexico	23.4	23.7	23.6	22.9	22.9	23.1	23.3	23.1	23.9		
USA	27.9	27.9	27.9	27.5	26.6	26.6	26.4	26.7	26.8		

The colors in the chart indicate the percentage difference compared with the median average weekly speed.

Decrease

- More than 30%
- Between 25 and 30%
- Between 20 and 25%
- Between 15 and 20%
- Between 10 and 15%
- Between 5 and 10%

No change

- Between -5 and 5%

Increase

- Between 5 and 10%
- Between 10 and 15%
- More than 15%



personalized emotion-aware services with the aid of mobile cloud computing and affective computing (Yu et al., 2015). As 5G allows to transmit Big Data in real time, real time diagnostics, as well as treatment, is possible. The speed factor is the fundamental reason that the 5G network could be successful in a mental health crisis. To date, cell phone applications have been used to collect data about patients that allow them to reach health professionals with just one text message. It is claimed that this system is to be effective as it represents a mobile crisis center (National Institute of Mental Health, 2020). The three times faster speeds of a 5G network provide a real time, no interruptions response to a patient's need, which is what distinguishes this technology from the older ones and why it is beneficial. Data collection can reveal information such as location, movement, and whether the patient will receive immediate care.

Another benefit of the increased speed is that it will allow experts to reach patients that reside in rural areas, where other forms of connectivity are lacking. A survey revealed that 60% of rural citizens in the United States face shortages in access to mental health professionals (National Institute of Mental Health, 2020). The medical industry is also able to use the features of high-speed networks by greatly reducing the time required to read large amounts of data from patients, whether it is personal information, clinical research, or high-resolution MRI and CT imaging information.

5G also enables remote monitoring devices, such as wearable technology, to send patient health data to doctors instantly, while also being able to know what kind of space the patient is currently working through the sensor to achieve more comprehensive and adaptive sexual medical or nursing methods.

The interconnectivity of medical devices enables instant remote monitoring of the mental health of patients that show symptoms of ASD caused by quarantine measures. A reliable way to achieve direct monitoring would be by invasive deep brain stimulation (DBS) as is already performed by neurosurgeons to treat obsessive compulsive disorder, which is characterized by an obsessive behavior in which the patient cannot stop what they are doing, e.g., washing hands or cleaning their surroundings. It is well documented that by employing advanced technology, biomedical sensors can provide an impressive possibility to measure human physiologic parameters in a continuous, real-time, and non-intrusive manner (Seshadri et al., 2019).

In the case of Big Data, devices monitoring the mental health of quarantined people could be placed in or on the body to track the mental and physiological status, such as the emotional and vital functions of the person and send them in real time *via* the IoT to medical cloud centers. There, artificial intelligence backed systems could analyze data in real time and alert alarm medical response teams. They could even initiate emergency measures in cases where the condition of the person is deteriorating, which could lead e.g., to self-harming behavior. On the one hand, this means that immediate intervention is made possible through the utilization of 5G's instantaneous connectivity. On the other, the long-term implications of quarantine measures could be analyzed using real-time data over a prolonged period of time, and thus reveal important insights to prevent symptoms of ASD.

These types of procedure would, of course, be highly questionable ethically but nevertheless, show the power and capabilities of 5G technology. Since neurostimulators are already widely used, e.g., to listen to and stimulate electric current in the brain at the same time, 5G could help to understand the symptoms of ASD caused by quarantine measures and even serve for instant diagnostics and treatment for vulnerable people (Manke, 2018). Combining the potential of 5G with the power of brain pacemakers or any other body-attached devices opens a huge potential for suicidal or depression treatment, or any other negative effects caused by long-term lockdowns.

We will next show the potential of 5G in medical applications by simulating the download speed of 5G compared to the 4G download speed (in Mbps) during the COVID-19 pandemic. The potential time saved indicates that the higher capacity enabled by 5G would allow medical response teams to react faster and thus save more lives when it comes to life-threatening mental conditions caused by symptoms of ASD caused by quarantine measures. It is important to note that the reduction in download speed took place in the absence of any real time health data monitoring, simply due to increased use of the internet. This means that in the presence of health data monitoring, the potential reduction in download speed, and transferrable data, would be even more significant. For our analysis we focused on the relation of data being not able to be transmitted due to reduction in download speed, compared to a 5G framework.

**Table 2** provides data on the 4G download speed reduction across Asia, Europe, the Middle East, Africa, South, and Central America, and North America on a weekly basis between the last week of January and the fourth week of March (January 27 to March 29) (for more information regarding the data collection and source of the data, refer to <https://www.opensignal.com>).

Based on this data we compare a regular 5G transmission speed of 10 *gigabits* per second (Gbps). Regular data transmission channels *via* 4G face problems like Large Volume of Data, Bandwidth Fluctuations, and High Channel Error Rates. E.g., the amount of uncompressed data is large, even for a single patient. Transmitting a large amount of generated data over a wireless link in a real time fashion is a considerable challenge (Kang, 2014). Given a world population size of almost 7.79 billion globally, this means that a day worth of digital mental and physiological data would encompass 3.795 billion GB of data each day, or 43,923 GBps, additional on currently transmitted data.

Since our data set comprises 40 nations, totaling 62 billion people, a day worth of digital mental and physiological data would encompass 1, 31 billion GB of data each day, or 15,179 GBps. The total Mbps transferred over the 9 weeks across all 40 nations was 10,380 Mbps. Considering the average reduction over 9 weeks of  $-1.2\%$  of data transfer speed across all 40 nations, this would result in an average loss of deliverable data of  $-0.28$  Mbps/week, totaling  $-95.83$  Mbps/week.

In total, this means that under the current 4G network capacities, the total pro-rata loss would be  $-0.92\%$  or  $-140.15$  Gbps across the 40 nations. Considering that a day of data potentially encompasses 500MB per person, the equivalent of a loss of  $-140.15$  Gbps would be an uncovered amount of 500 people per second or 43.25 million people per day. Given

the transmission speed of 10 Gbps, 5G would enable coverage of these 43.25 million people who might not be covered under the regular 4G network speed as these people might potentially need medical aid throughout a day due to ASD symptoms. The results of this study are in line with recent findings. For instance, Thomas et al. (2021) discuss “how” and how “effective” modern technologies are in controlling the COVID-19 outbreak. They also discussed the pros and cons of social media and television in ensuring global connectivity and awareness.

## CONCLUSION

Big Data can be useful for public health interventions, especially in crisis times like the COVID-19 pandemic. Even though quarantine is a critical method for managing infection and the spread of disease, it has side effects such as increasing the number of people who suffer from ASD and PTSD. A new intervention model that adopts digital media could alleviate this problem.

The development and rollout of the 5G network enables interconnectivity among devices at an incredible speed. While real time data about the physiological and emotional well-being of humans during a lockdown has not been generated yet, 5G opens the possibility of gathering data about not only the psychological status of quarantined people but also provides the possibility for instantaneous intervention by medical response teams in cases of deteriorating psychological and physiological conditions through real-time connection, e.g., AI-backed mental health monitoring systems. The IoT is therefore a useful tool for the 5G infrastructure to work on a comprehensive real-time health monitoring system that could benefit not only the affected people but also policymakers, enabling them to better understand the long-term health effects of quarantine and lockdown measures.

The present study took internet usage as a proxy for Big Data utilization and tested the effect of internet usage per population in 173 countries on the mental health conditions in the corresponding population, measured by the DALYs, which measures the years lived with disability or health burden. We

found the positive effect of internet usage on mental health in 110 countries, out of 173, by looking at yearly changes in internet usage and the reduction in DALYs. The results show geographically interesting distributions as the effect seems to be biggest in North and South America, followed by the Arabic region, Asia and the South/Pacific, and then Europe and Africa. The distribution reveals certain conclusions, such as a higher awareness in populations in North and South America about the positive effect of using digital information on health conditions. Poor results in Europe indicate hesitation in the population about the digital information provided in improving health conditions, while the poor results in Africa might be caused by lack of infrastructure and accessibility to online sources as well as affordability.

Taking historical 4G download speed reductions during the COVID-19 pandemic, we calculate that given the transmission speed of 10 Gbps, 5G would enable the real time transmission of digital mental and physiological data of 43.25 million more people who suffer from ASD symptoms caused by quarantine measures per day to remote medical response teams, than under the current 4G capacities.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.569024/full#supplementary-material>

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# A Qualitative Content Analysis of Online Public Mental Health Resources for COVID-19

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The COVID-19 pandemic has far reaching potential public mental health impacts and is linked to higher levels of depression and anxiety. To address these in part, online information resources acted as mass interventions. It is vital to explore the content of these interventions, to consider the framing of the pandemic and to examine the extent to which their content is relevant. In March 2020, a qualitative content analysis was undertaken of 39 easily accessible online resources that offered advice, tips or guidance relating to mental health or mental wellbeing and COVID-19. Their content was compared to subsequent reports of the mental health impact of the pandemic. Resources frequently focused on anxiety. The content of intervention was typically of a cognitive-behavioral nature, with a significant focus on maintaining social contact. Typically, distress related to the situation was normalized and stigmatizing language was not seen. Data revealed a significant impact of the pandemic on depression as well as anxiety measures in the general UK population. A key recommendation is to ensure both depression and anxiety are addressed in these public mental health resources.

**Keywords:** information quality, online intervention, qualitative, mental health, COVID-19, mass intervention, online health information

## INTRODUCTION

The COVID-19 pandemic presented a major public health and public mental health challenge. At the start of the pandemic in March 2020, reviews of the impact of restrictions such as quarantine and COVID-19 itself pointed to an understandable effect on psychological wellbeing and mental health. Prior to COVID-19, research on the psychological impacts of epidemics and quarantine suggested high risk of potential distress including confusion, loss, anger, frustration, low mood, fear, stress, insomnia and boredom, with a minority of participants reporting high levels of depressive symptoms and anxiety (1–7). Given the impact on entire populations, often under protective measures that restrict their movement and interaction with others, even a minority of the population represents a significant number of people in distress and a significant challenge to the mental health services. UK data suggest that anxiety and depression levels “spiked” at the point at which the lockdown strategy was announced (8), prompting online public mental health information.

“Lockdown” and threat of illness are stressful. Stopping work, loss of routine, reduced physical social contact, a sense of isolation and loss of day-to-day activities are all identified as stressors, which can be addressed with coping and stress management techniques, problem solving, self-care,

alleviation boredom, use of social networks, engagement with reliable information and re-iterating the purpose of isolation is to keep others safe (1, 2, 9). Sharing basic strategies to manage this distress has been recommended (10), alongside a need for online psychoeducation and self-management support, with self-directed interventions (7, 11–13).

Numerous online resources offering support and guidance on how to manage one's mental health were published in March 2020, in the period where the pandemic rose to the public's awareness and protective measures were enacted in many nations. These were effectively mass interventions, to attempt to maintain psychological wellbeing or minimize adverse impact on mental health. Many online resources were produced, however for these to be useful, their content must be optimized. Some would argue that anxiety and distress in the face of this global health threat is entirely normal. However, it is also important to offer support and strategies to maintain wellbeing, and further intervention where people require more specialist mental health support.

The content of online resources intending to address mental health needs to be explored, to highlight any areas of omission in particular. This is important both at the time of the protective measures being put into place and subsequently, to learn from this pandemic and plan for the next. Indeed, future pandemics are thought to be “inevitable” (14). Mental health is key in their management: avoiding or treating depression and anxiety is important in its own right, but also as they may be linked to lower engagement in adaptive health-behaviors needed for COVID-19, as they are for many other health behaviors (15). The way in which these resources frame both COVID-19 and mental health is also important to understand and potentially improve. Excessive fear arousal or global descriptions of lack of personal control are likely to risk both mental health and adherence to public health infection reduction measures (16, 17). Stigmatizing messages must be avoided, for both mental health and COVID-19 (1). This study aimed to complete a rapid content analysis of the easily accessible, online resources to elucidate their content, comparing these to subsequent data on the mental health impact of the pandemic.

## METHOD

### Sampling of Resources

Google search for “COVID-19 mental health” was conducted (29/03/2020). The first twenty results that included guidance and advice were selected for analysis. An additional 10 novel results (i.e. disregarding duplicates from previous search) from a search for “COVID-19 mental wellbeing” were also selected. The searches were limited to results in English and was conducted from google.co.uk. This was augmented by Twitter searches using the same terms, selecting results not duplicating those from the Google searches. Snowballing was used to identify further resources from links within the online documentation. Links to other resources were all noted and these resources then analyzed.

Analysis began immediately with the Google search results, then Twitter results and snowballed results. Sampling was ceased when saturation was reached.

## Evidence of the Mental Health Impact of COVID-19

The sampling of resources relating to the pandemic focused was conducted in the UK, and was limited to results in English. As such, the evidence we use to compare the impact of the pandemic on mental health uses UK focused data. The Office of National Statistics (ONS) is a UK government organization that collects, analyses and reports on relevant health, wellbeing, economic and population data. During the COVID-19 pandemic, they have collected and reported data relating to anxiety and depression symptom experience in adults. Data were collected using common measures—the Patient Health Questionnaire for depression (18) and the Generalized Anxiety Disorder assessment for anxiety (19). The measures provide an indication of those with probable clinical levels of depression or anxiety. These data were used to identify the estimated actual impact on the pandemic on mental health. An ONS report on depression provides data from pre-pandemic, 2020 and January-March 2021 (20). The report on anxiety uses data from the early pandemic—from April to May 2020 (21). These are supplemented by a report presenting data from July-August 2021 (22).

## Data Analysis

The content from each resource was downloaded. Qualitative content analysis was used inductively to code the data, as this approach allows analysis of both the explicit content and the latent meaning (23). Descriptions of the (a) type of data source, (b) type of resource, and (c) focus/topics were analyzed to create discrete categories addressing each factor. The details of the guidance itself were initially described with open-ended, descriptive responses. These were inspected to form inductive categories relating to each of the six areas outlined in the data collection (key message, diagnostic categories, responsibility, mechanism for change, normalization, claims). After analysis of 10 resources, initial categories were created and each resource re-checked for the presence of all categories. As analysis continued, with each new category, the previous resources were re-checked to explore whether this category was present. All data were first analyzed by one researcher, and then second coded by the other.

Coding continued until all the initially identified resources had been analyzed. During this process, it was noted whether each new resource was adding any new data. Saturation was used as the criterion as to whether it was necessary to seek further resources. Saturation was defined as resources being redundant, in that no new data advanced the conceptual categories (24, 25). Forty percentage of the resource data were second coded, and inter-rater reliability was calculated (26), with the protocol that a kappa <0.90 would lead to second coding of all data.

## RESULTS

The 30 resources identified from Google were supplemented with a further 19 identified from Twitter or snowballing. These included the resources published by Public Health England, UK National Health Service, World Health Organization, United States Center for Disease Control and several mental

**TABLE 1** | Lists the organizations that produced the resources.

Source	Type of source
Public health England	UK Government
Mental health foundation	Charity—public mental health
Mind	Charity—mental health
NHS Every mind matters	UK National Health Service
WHO	World Health Organisation
Rethink mental illness	Charity for people with “Mental illness”
CDC	United States Centre for Disease Control
Mental Health UK	Charity for mental health
Mates in mind	Charity supporting mental health for employers, particularly construction industry
NI Gov	Northern Ireland Government
A24	Medical staffing business
University of London	University
Lifeline	Charity—Australian—Crisis support
Circle 2 success	Private company that supports businesses
Student minds	Student mental health charity
Truro college	College website
National survivor user network	Charity—mental health service survivors
BBC News	British Broadcasting Co-operation, journalists
Self-injury Support	Charity—mental health—self injury
NHS Every mind matters	UK National Health Service
Friendship bench	Charity—mental health—international but based in Africa
#InThisTogether	National Mental Health Commission, Australia
UCL with City Councils	University supporting a local council
Charlie waller	Charity—mental health
Psychology today	Psychology magazine
Help with mental health	For profit psychological clinical services
WCCBT	Professional confederation—World Confederation of Cognitive Behavioral Therapy
Dulwich Centre	Charity—mental health survivors—Australia
Guardian	UK newspaper
Head to health	Charity—mental health—Australia
Kevin MD	An individual's website, ran for business
PsychReg	Online psychology resource
Samaritans	Charity—mental health and crisis support
Mental health Europe	Network of mental health users, professionals, service providers across Europe
Nature	Scientific publication
Healthonline	Online health magazine/resource
Somerset council	Local government council
MARCH	Research network
Mental health foundation	Mental health charity

health charities. A list of the resources is given in **Table 1**. On close inspection, four of the resources identified from Google were excluded as they did not include novel guidance on mental health or wellbeing, and six of the resources identified from snowballing were also excluded for this reason. Analysis was conducted on 39 resources. No new themes or topics were identified at the end of the analysis of the identified

**TABLE 2** | Content of COVID-19 mental health focused online resources.

Strategy	Sub-strategy	Number of resources (%)
Normalizes		30 (77)
Social support	Stay/get connected socially	34 (87)
	Help other people	24 (62)
Physical self-care	General advice including diet, smoking, alcohol	23 (59)
	Exercise	23 (59)
	Sleep	13 (33)
Media	Access trustworthy information	23 (59)
	Manage/limit media intake	23 (59)
Activity	Routine	22 (56)
	Do activities/stay busy	13 (33)
	Specifically do useful things	7 (18)
	Specifically do what you enjoy	16 (41)
	Specifically learn new things/keep mind active	11 (28)
	Specifically do creative things	8 (21)
	Specifically be outside/in contact with nature	10 (26)
	Set goals	6 (15)
Cognitive strategies	Mindfulness/focus on present	17 (44)
	Focus on what you can control	14 (36)
	Cognitive reframing	18 (46)
	Problem solving	3 (8)
Relaxation/managing arousal		16 (41)
Emotional expression		12 (31)
Relationship management/communication strategies		7 (18)
Attending to physical environment		4 (10)

resources, therefore no further sampling was conducted. Inter-rated reliability of kappa 0.94 was achieved for second coding of 40% of the resources.

**Table 2** provides a summary of the results, which are described in further detail below.

## Framing of the Situation, Impact, and Resource

The COVID-19 pandemic was mostly referred to as “COVID-19 outbreak” or simply as “COVID-19” or “coronavirus.” Almost all resources specifically named the situation, with the language of outbreak, virus name, pandemic or epidemic used. Just four resources did not use this language, instead referring to “lockdown,” “crisis,” or “social isolation.” Potentially stigmatizing language of “Wuhan virus” or “Chinese virus” were not seen.

The impact of the situation on psychological wellbeing and mental health typically included significant attempts to normalize. Resources described the situation as having an impact on everyone, emphasizing universality. Worry and stress were

described as “natural,” “normal” and “understandable.” Many described that everyone would react differently. Some described examples of specific people’s experiences, to exemplify potential reactions. Of the 39 inspected resources, nine did not offer normalization of psychological distress. Some of these were very brief resources, however four were resources, longer than a list of tips, from mental health charities. Most resources did not use diagnostic labels to describe people’s experiences, and offer normalization of distress. Where diagnostic categories were used and where symptoms or difficulties were described, the focus was on anxiety.

Whilst resources described a range of potential emotional and psychological impacts, the majority focused on anxiety and its management, focusing on “worry,” “stress,” “anxiety,” “fear” and “uncertainty”.

The resources were published by a range of organizations, as show in **Table 1**. The results reflect to some extent the geographical location of the authors, and cover international, national, and local sources, from governments, charities, businesses, and individuals. They are mostly lists of instructions, sometimes with text preceding these instructions. The intended aims or claims of what the resources could offer were commonly to “look after,” “help,” “support,” “take care,” “manage” and “protect.” No resource made claims to remove distress or treat.

## Content of Resources

The resources offered a range of strategies, detailed in **Table 2**. The majority of resources offered a list of tips or strategies. The resources then were frequently very brief, offering little detail on how to implement the suggested tips or strategies.

It was rare to see the likelihood of achieving these acknowledged, with just one resource explicitly suggesting “cut yourself some slack.” Managing expectations of oneself was rarely acknowledged. The majority of advice did not acknowledge the other challenges that people may be facing, including lack of time owing to caring responsibilities, ongoing work expectations and challenges, potential ill-health, financial stressors, and difficulties in managing how to obtain everyday items such as food.

Social support was most commonly suggested. Self-care, management of media usage, maintenance of activities, and use of cognitive strategies were all advised. Several resources included content on focusing on what one can control as a cognitive strategy. Arousal reduction and emotional expression were also offered. Less commonly offered were advice relating to managing personal relationships and maintaining or altering one’s physical environment. Within the cognitive focused advice, several resources offer prompts to consider the positives or solve problems, without offering further guidance on how this can be achieved. Some suggested the situation be reframed as an opportunity. An emphasis on kindness and gratitude was also seen.

## Comparison of Resource Coverage to Mental Health Impact

Data from the ONS observed an increase in depression in the general population from pre-pandemic levels of around 10 to 19% in June and November 2020, and 21% in January-March 2021 (20). These data relate to those aged 16 or more.

Interestingly, depression was most common at 34% in the 16–29 year old age range (compared to just 10% in people aged at least 70 years). This age group are of course highly internet literate. For anxiety, in March-April 2020, at the very start of the pandemic in the UK and during a period of extreme uncertainty, 49.6% of people reported high anxiety (21). The mean score of the anxiety measure was 5.2/10, up from 3.0/10 at the end of 2019. Data from July-August 2021 show on ongoing higher than pre-pandemic level of depression, being 17% (compared to pre-pandemic levels of 10%) (22).

## DISCUSSION

Analysis examined the framing and content of a variety of online resources aiming to support psychological wellbeing. The epidemic was referred to without using stigmatizing language for either the virus or the impact on mental wellbeing. Normalizing and contextualizing distress during a distressing situation is vital, as it can offer a sense of universality and not stigmatize what is understandable during this time of threat. Resources were found to be stating aims to help support mental wellbeing, which is an appropriate aim as these mass, online resources are not to replace therapy or interventions to treat mental health problems.

Overall the content of interventions could be broadly construed as including elements of cognitive-behavioral therapies, including elements of mindfulness and acceptance commitment approaches, such as thought defusion (27). The focus on maintaining activity and social contact address likely stressors of the situation. Practical strategies are frequently offered. These strategies can address both low mood and anxiety related difficulties as they form elements of behavioral activation (28). Cognitive intervention is overall less frequently offered, and again tends to focus on anxious thinking, however could be equally well applied to depressive rumination, for example techniques of reframing and defusing from thoughts may be useful for both types of difficulties (29). Control is a theme in nearly half the resources, typically with advice to focus on what you can control. This is highly relevant as appropriate control beliefs are linked to reduced anxiety (16). This is particularly important messaging to avoid fatalism, which may reduce protective health behaviors of handwashing and social distancing (15).

The data concerning the impact of the pandemic show a large increase in both depression and anxiety. A clear recommendation results from comparing this to the content of the resources. The majority of resources focused on anxiety related symptoms and strategies. It is vital ensure impact on depressive symptoms is also acknowledged, given preliminary findings of increased depression (8).

A number of additional recommendations arise from the findings. First, most resources were didactic information giving. These could usefully be augmented with guided activities, to increase engagement with the resources’ advice. This could include links to activities to support people to problem solve, cognitively reframe, set goals and so on. Most people are likely to be able to spontaneously do these activities, however some may



require further support. Second, the pandemic events are outside of personal control, potentially leading feelings of helplessness, which are linked to low mood and depression (30). More attention should be given in resources to reducing rumination, replacing both anxious and low-mood related thoughts with alternatives or defusing from thoughts. Third, the resources' content could potentially feel overwhelming itself: a single parent, struggling to manage a toddler at home and continue to work, experiencing financial difficulties and stress when trying to acquire food shopping may find a list suggesting great social contact and doing creative activities somewhat at odds with their personal experience. Noting the context is vital and recognizing this may be having a very significant impact may help some to feel more understood and the resources to feel more relevant. Fourth, and related to the previous recommendation, it may be important to include guidance on adapting ones' expectations of oneself. The current challenges may activate core beliefs about being not good enough, which may be further triggered by lists of activities to do. This could be simply acknowledging a need to shift one's expectations from normal level of achievement or activity to abnormal ones, given the abnormal situation. Fifth, resources could continue to emphasize the rationale of the restrictions to movement, emphasizing the shared experience; social cohesion and resilience; and collective responsibility to act, in the collective good (31, 32).

Finally, two areas were commonly omitted. First, the importance of managing personal relationships was rarely mentioned. It is important to note that loneliness was observed in 27% of a UK sample in March-April 2020 (33). Addressing the maintenance of relationships during times of protective measures that restrict social interaction is then vital. In addition to the significant risk of increased domestic violence, the stress of confinement may affect many relationships within the home. Raising this issue and inclusion of basic guidance on communication skills may be beneficial (34). Second, greater awareness raising of the potential impact on mental wellbeing of home environment may be beneficial, particularly as this is an area over which many people will have some control (35).

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## Limitations

This study is limited by its sampling. Only resources written in English were included, limiting its coverage and generalisability, however resources from a range of sources were included. The limitation to resources written in English does also limit the underlying cultural assumptions and approaches offered. Only resources relating to a general population were included, advice for health-workers and children must also be made available to the highest standard. It is not possible to review the resources against existing evidence standards, as no such standards exist; rather we sought to summarize the content, consider its empirical basis, and highlight areas of omission.

## CONCLUSION

In conclusion, the resources relating to public mental health addressed important topics. Supportive, comprehensive, empirically grounded resources can help maintain mental wellbeing for many, thus reducing future impact on mental health services, allowing them to focus on those with existing difficulties and high levels of distress. Such resources must address not only anxiety, but also depression. Given the high risk of future pandemics, the recommendations may inform future mass mental health support interventions.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

## AUTHOR CONTRIBUTIONS

FM conceived of the study, coded data, and co-drafted the manuscript. TO gave methodological advice, coded data, co-drafted, and edited the manuscript. All authors contributed to the article and approved the submitted version.

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