

# Mental health promotion during COVID-19: Applications from self-care resources, lifestyles, and environments.

**Edited by**

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# Mental health promotion during COVID-19: Applications from self-care resources, lifestyles, and environments.

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# Editorial: Mental health promotion during COVID-19: applications from self-care resources, lifestyles, and environments

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## KEYWORDS

COVID-19, mental health crisis, self-care, health psychological wellbeing, pandemic (COVID19)

## Editorial on the Research Topic

**Mental health promotion during COVID-19: applications from self-care resources, lifestyles, and environments**

The COVID-19 pandemic has had profound and wide-ranging effects beyond its medical implications, causing significant sociological, psychological, and economic consequences on a global scale. This pandemic posed a significant social challenge, and it has also provided us with invaluable lessons learned from facing this unprecedented situation. Specifically, recognizing the significance of self-care as a psychological resource in managing the pandemic mental health consequences, which has become increasingly crucial, and will continue to be critical in future public health crises.

The WHO defines self-care as: “the ability of individuals, families and communities to promote health, prevent disease and maintain health, and to cope with illness and disability with or without the support of a healthcare provider” (World Health Organization, 2009, p. 17). Self-care is not solely for personal benefit, as it also has the potential to impact the social and political environments. These environments can, in turn, enable self-care for individuals who grow up and interact within those spaces, leading to a ripple effect of potential wellbeing. This fact highlights the importance of individuals that engage in self-care or health-protection activities as citizens, as their actions can have a collective impact and influence others.

In light of these considerations, we announced the launch of our Research Topic on October 22nd, 2021. This editorial piece highlights the contributions to the impact of self-care practices in promoting mental wellbeing and mitigating the mental health problems caused by the COVID-19 pandemic in different populations. A total of 14 articles were finally published, comprising 13 research articles and one opinion piece, authored by 87 scholars from eight different countries (Figure 1).

The manuscripts were featured in the section of Health Psychology and their primary focus was on one of these three key themes.

## 1. Exploring the impact of social determinants of health on the ability of the general population to engage in self-care

Since the beginning of the pandemic, lockdown measures have caused a remarkable negative emotional impact on the general population, as noticed in the increase in negative mental symptoms such as stress, anxiety, or depression. [Al Zabadi et al.](#) investigated the prevalence and predictors of stress and anxiety among Palestinian young adults at the onset of the pandemic. Their findings indicated that those with low socioeconomic status and inadequate access to food were at greater risk for elevated levels of stress and anxiety. In contrast, [Wu et al.](#) proposed a novel approach to anxiety management through guided respiration practice, employing smartwatches, which they tested on a Chinese population. Their results demonstrated the potential efficacy of this intervention in controlling anxiety levels.

[Lu et al.](#) conducted a study on emotional changes in the Chinese population during the first months after the COVID-19 outbreak, utilizing an online group psychological intervention model. Their findings indicated that people's emotions quickly shifted from stress, anxiety, and isolation to hope for a return to normalcy. The group psychological crisis intervention model proved to be effective in regulating negative emotions and provided members with a safe space for communication. However, the resumption of in-person events has been slow and gradual, necessitating measures such as control of capacity of closed-spaces and prohibiting indoor activities. [Anisimovich et al.](#) investigated the impact of the pandemic on cultural and arts engagement patterns, with a focus on the experiences of the audience in Liverpool (UK). The study highlighted the pandemic's influence on the ways people engage with the arts and culture, which were seen as helpful in rebuilding personal resilience and confidence. These findings underscore the importance of providing support for individuals and communities to cope with the emotional and social impacts of the pandemic.

## 2. Risk factors and resilience at the family level

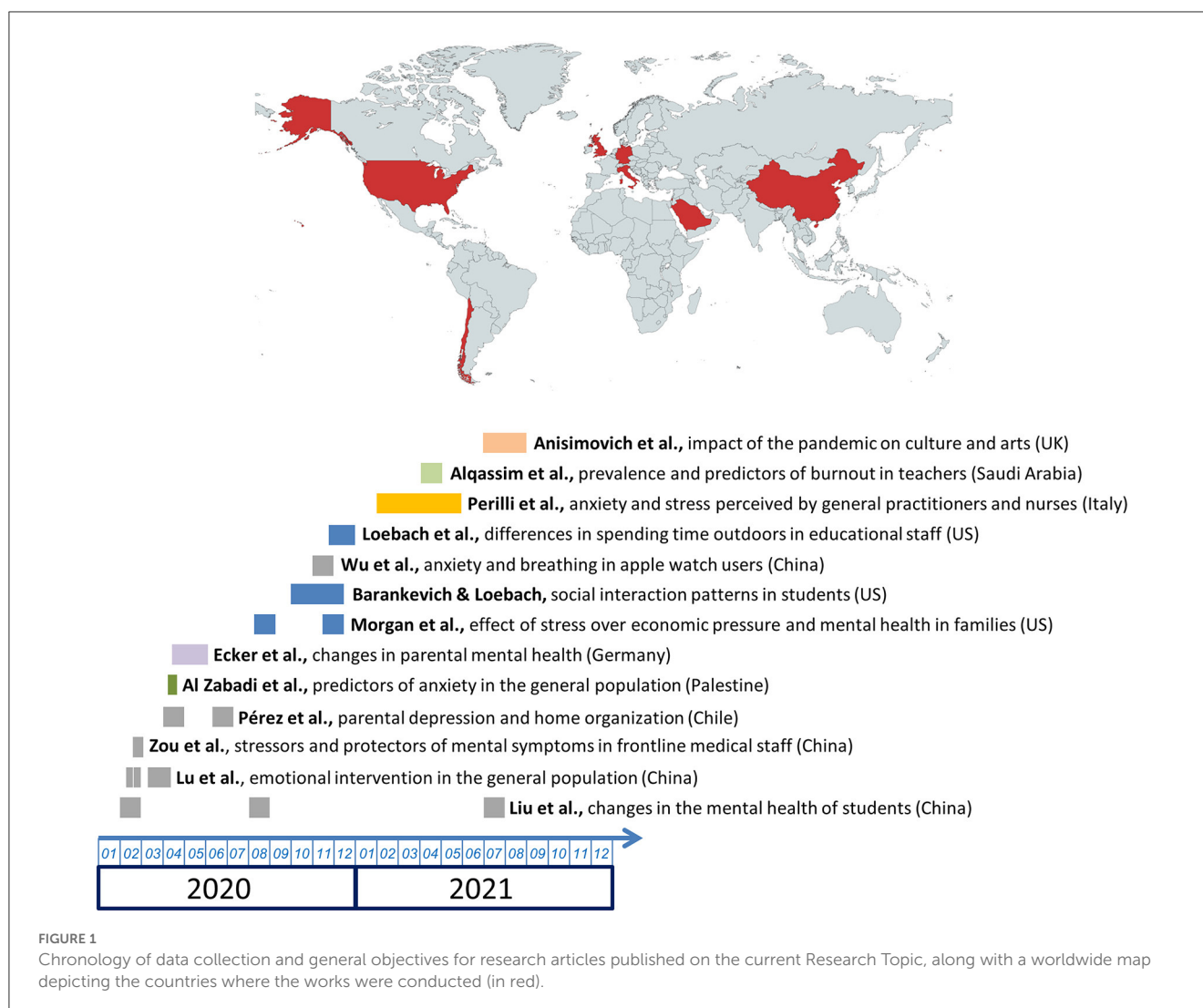
This pandemic has also changed the organization of families at home. A study conducted in Germany during the early phase of the pandemic by [Ecker et al.](#) found that parents were not necessarily at risk due to additional burdens, but instead they had better prospects for coping than those without children. In a longitudinal study carried out on Chilean parents, [Pérez et al.](#) reported an increase in depression and home chaos with respect pre-pandemic levels, which was moderated by factors such as financial stability, personality, and recent major stressful events. Additionally, research conducted among parents in Texas (USA) by [Morgan et al.](#) found that economic pressure led to worsened mental

health, with stress mediating this pathway. Moreover, approach coping strategies were found to be more effective in moderating the association between stress and later anxiety symptoms compared to avoidant coping strategies. [Sánchez-Hernández et al.](#) suggested the implementation of interventions aiming at the promotion of resilience and emotional self-care to mitigate the impact of pandemics on families and healthcare professionals.

## 3. Demands and resources in two main professional sectors at risk: healthcare and education

Regarding the healthcare sector, the outbreak increased work demands for healthcare professionals, which had a particular impact on their mental health. [Zou et al.](#) explored the role of perceived stress and social support in explaining the relationship between three negative symptoms (e.g., occupational stressors and anxiety, depression, and insomnia) among the frontline medical staff at the beginning of the pandemic in Wenzhou (China). They reported that occupational stressors were related to all negative symptoms, with perceived stress mediating, and social support moderating these associations. [Perilli et al.](#) evaluated perceived anxiety and stress by general practitioners and by hospital ward nurses in the district of ASL1 Avezzano-Sulmona-L'Aquila (Italy) during acute phase of the pandemic. They found higher levels of anxiety in general practitioners than among nurses, which were associated with increases in emotional distress. In addition, anxiety increases were coped with by enlarging the demand for social support in general practitioners. This coping strategy correlated with emotional distress and when enhanced, it corresponded to avoidance of the problem.

The pandemic also interrupted education-learning processes, which added more stressors to students, teachers, and education staff since they had to change their working styles. [Alqassim et al.](#) examined the prevalence and the associated factors of burnout among schoolteachers in the Jazan Region (Saudi Arabia) in April 2021. Authors indicate that most teachers showed burnout symptoms, which were related to taking psychotropic medications, absenteeism, lack of job satisfaction, and school change. On the other hand, being an expert and having the ability to adapt to technology proved to reduce burnout symptoms effectively. [Loebach et al.](#) explored whether education staff from the state of New York (USA) spent more time outdoors during the pandemic as compared to pre-pandemic times. The majority of participants reported spending more time in natural outdoor environments since the pandemic had emerged, particularly in its early stages. The relative accessibility of those environments impacted the behavior of the participants. In terms of the number of occasions being outdoors and the number of natural outdoor environments visited. [Liu et al.](#) investigated the dynamic changes in the mental health status of Chinese university students in Xuzhou (province of Jiangsu) since the outbreak of the pandemic and after 1 year. They reported that the degree of recognition of the pandemic was an important factor that significantly affected the psychological state of college students, and that effective control of the environment slightly improved the behavior and mental state of the students.



Similarly, Barankevich and Loebach explored the social interaction patterns of university students in northeastern USA during the outbreak of COVID-19. They suggested that students had spent significantly less time interacting with non-roommates in person during the pandemic, and more time in voice and video calls, and that meaningfulness had been higher for interactions with family or friends.

In summary, the aforementioned studies provide robust evidence about the importance of considering the social determinants of mental health to promote mental wellbeing, and the central role self-care plays. It has been highlighted that self-care can positively influence health attitudes and behaviors in the population. Promoting mental health with a central focus on self-care enhances the quality of life, alleviates clinical symptoms, and increases awareness and use of available individual and collective health resources. Additionally, evidence supports the effectiveness of collective and individual actions on self-care, as they can favor healthy environments and lifestyles, and facilitate citizen reflection on self-management practices from a context-based perspective. Likewise, self-management practices can guide the implementation of targeted actions aimed at reducing the

most prevalent health risks in the community. Thus, future public health recommendations should carefully consider the role of community-based decision-making actions that involve actively citizens to empower them to adopt and influence self-care behaviors, emphasizing problem-solving and collaborative development with health, social and political sectors.

## Author contributions

EL, MM, and EB-M were responsible for the manuscript design. All authors contributed to this work and approved the final manuscript.

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participants of the studies for helping to understand the situations that involve self-care.

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# Promotion of Resilience and Emotional Self-Care in Families and Health Professionals in Times of COVID-19

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## INTRODUCTION

Populations affected by the COVID-19 pandemic have a significantly higher prevalence of depression, anxiety, insomnia, post-traumatic stress disorder, and psychological stress compared to the general population under normal circumstances, as indicated by the meta-analysis by Cénat et al. (2021). Other studies with large samples carried out in different countries indicate that throughout the confinement, there is a progressive worsening of mental health (Ammar et al., 2020). On the other hand, we know that the application and increase in the levels of social distancing have been necessary, since the results of the studies find that they have conducted to a significant reduction in the spread of infection and the number of deaths (Daghiri and Ozmen, 2021). Some studies indicate that the population may be hard to adhere to these restrictions and the population may have fatigue in performing social distancing rules (Harvey, 2020; Shirali et al., 2021).

Gilbody et al. (2021) note that the mental health research community has been successful in describing the nature of the impact of COVID-19, but less so in generating solutions and providing clinical trial data to establish what works to mitigate the impacts. We suggest employing interventions to promote resilience in families. We also reflect on the need for the emotional self-care of mental health professionals in this context of a pandemic.

## PROMOTION OF RESILIENCE IN FAMILIES IN THE FACE OF CONFINEMENT IN THE COVID-19 PANDEMIC

A study by Zayas et al. (2021) points to the need for interventions to promote resilience for the general population in times of pandemic, alluding to the study on the preliminary analyzes of the “Resilience and Well-being Programme: Stay at Home” (Sánchez-Hernández and Canales, 2020a,b), which is a psycho-educational intervention applied in confinement and de-escalation of the first wave of the pandemic in Spain, to promote well-being and prevent emotional problems (see Table 1). The sample consisted of 259 participants, 68.3% women and 31.7% men, with a mean age of 39.33 years (SD = 14.3). The group that received the Resilience and Well-being Programme was made up of 80 participants and the control group by 179 (Sánchez-Hernández and Canales, 2021). Participants reported high satisfaction with the programme and improvement, from pretest to post-test, in resilience, psychological well-being, post-traumatic stress symptoms, ease of



**TABLE 1 |** Well-being Pills from the resilience and wellness program: “stay at home” (Sánchez-Hernández and Canales, 2020b).

Well-being Pills	Main theoretical approaches	References	Main applied content
1. Resilience	Psychoeducation Motivational Interview Positive Psychology	Forés and Grané, 2008; Sánchez-Hernández et al., 2009	Accept and understand that it is normal to have doubts. Find out from reliable sources (professionals and health centers...) and follow their recommendations. Doing so is a sign of social altruism. Choose some time of the day to update the information avoiding unnecessary excess information. Identify and reflect on the helpful factors that promote personal and family resilience.
2. Family Strengths	Behavioral Activation and Positive Psychology	Peterson and Seligman, 2004; Sánchez-Hernández et al., 2019	Keep doing pleasant activities and move your body (sports, dance, listen to music...) establishing a schedule to do them. Keep socializing, following the health recommendations. Identify and use personal and family psychological strengths. Take care of your diet, healthy sleep habits and sunbathe from your terrace, balcony or window.
3. Emotional management	Emotional Education	Sánchez-Hernández et al., 2019	Accept and understand all your emotions (and those of others), both negative and positive. Regulate your emotions with deep breathing, positive imagery, powerful postures, calming self-talk, mindfulness, and sharing them with trusted people.
4. Love and Secure Attachment	Positive Psychology, attachment, and Cognitive-Behavioral Therapy	Seligman et al., 2005; Hoffman et al., 2019;	Make time to play and connect with your loved ones. Kindly welcome and embrace the emotions of your loved ones. Encourage constructive communication with your family and friends.
5. Hope	Positive Psychology and Acceptance and Commitment Therapy	Snyder, 2000; Ciarrochi et al., 2016	Reflect on strengths, supports, skills and abilities that you have used in challenging situations in the past, which will help generate hope. Be grateful and appreciate what you have and what happens in your day to day.
6. Optimism	Positive Psychology and Cognitive Therapy	Seligman et al., 2005; Sánchez-Hernández et al., 2016	The naïve optimist denies reality and tends to recklessness. The exaggerated pessimist becomes blocked and makes others uncomfortable. The intelligent optimist sees reality and has a plan of action to deal with it. You can schedule limited time for excessive worrying and debating catastrophic thoughts.
7. Life Sense	Positive Psychology	Steger, 2009	How can we improve as a society from this experience? In the future, when all this happens... How would you like to relate to your grandchildren the attitude with which you faced all this? What values would be important to you at this time?

handling the pandemic, and mood. The analyzes of differences between the groups indicate, in a statistically significant way, that the group to which the programme was applied has fewer symptoms of post-traumatic stress, greater ease of dealing with the pandemic, and better mood, compared to the control group in the post-test (Sánchez-Hernández, 2020b; Sánchez-Hernández and Canales, 2021). The analyzes (Sánchez-Hernández, 2020a; Sánchez-Hernández and Canales, 2021) indicate that satisfaction with the programme, following the programme's guidelines, and the development of certain programme skills, predict following prudent and healthy behaviors during confinement (e.g., staying home, wearing masks, social distancing, hand washing, and

follow sanitary recommendations in general). These results are encouraging and have yet to be confirmed with experimental design studies.

## EMOTIONAL SELF-CARE OF MENTAL HEALTH PROFESSIONALS

Mental Health professionals are at increased risk of burnout, due to the emotional demands of their work. Studies found that the prevalence of burnout among them can range from 20 to 40 percent (O'Connor et al., 2018; Laverdière et al., 2019; Yang and Hayes, 2020). In particular, during the COVID-19 pandemic,

health professionals have been at heightened risk of depression, anxiety, burnout, insomnia and other disorders (Morin and Carrier, 2020; Al-Humadi et al., 2021; Olashore et al., 2021; Rajabimajd et al., 2021). The COVID-19 pandemic has caused heavy psychological impact among healthcare professionals especially women and frontline workers (Sun et al., 2021). In addition to this, healthcare providers may receive public stigma (Patel et al., 2021).

Positive psychology interventions (PPI) are intentional activities that aim to cultivate positive feelings, behaviors, or cognitions (Seligman et al., 2004). In a review of published papers on 15 PPIs conducted at places of work, in the period 2000–2011, improvements had been found, after interventions, in happiness, positive mood, positive emotions, vigor, positive self-perception, psychological capital (PsyCap-hope, optimism, and self-efficacy) and resilience, and reductions in stress, depression, and anxiety (Meyers et al., 2013).

Previous interventions have focused mostly on strengthening self-compassion, as a way helping professionals to cope with stress and prevent burnout, through mindfulness training or loving kindness meditation (i.e., Boellinghaus et al., 2014). A type of intervention found to be beneficial in work settings has been positive psychology. One of the basic models of such interventions is the PERMA model for well-being, designed by Peterson et al. (2005) and Seligman (2002, 2011). A fundamental exercise in positive psychology would be the counting of daily blessings (gratitude). In a gratitude intervention, participants are encouraged to reflect on, and acknowledge, things they are grateful for.

Mead et al. (2021) examined protective factors during the first wave of lockdown on the well-being in of 138 participants from the United Kingdom and found that “gratitude” and “tragic optimism” were identified as key positive psychological attributes contributing to well-being.

Lakioti et al. (2020) presented a study to investigate the factors that help therapists maintain their resilience to work stressors. Participants were Greek mental health practitioners ( $N = 163$ ). The study suggests that positive psychology concepts are useful variables in the mental health professionals’ resilience field. Particularly meaning, positive emotions, and satisfaction with relationships might play an important role in the development of strategies for improving therapists’ mental health and functioning. Litam (2021) conducted a study used a national sample of professional counselors ( $N = 161$ ) providing services during the COVID-19 pandemic to examine the extent to which perceived stress, coping response, resilience, and posttraumatic stress predict burnout, secondary traumatic stress, and compassion satisfaction. The results indicated that resilience

had a strong positive relationship with compassion satisfaction and a strong negative relationship with burnout. Perceived stress was also strongly positively related to burnout. This study’s findings emphasize the importance for professional counselors to cultivate resilience and self-care practices during the pandemic, and perhaps during crisis and disaster mental health counseling more generally. This finding has led to daily gratitude exercises being recommended for everyone, and but specifically for mental health professionals; it would be beneficial for them to write three good things that happened to them each day. It was found in meta-analyses that the most effective interventions at work were: gratitude and strengths (Donaldson et al., 2019). Moreover, the positive impact of gratitude has been found to contribute to longevity, well-being, and a reduction in psychopathology (Jans-Beken et al., 2020).

## DISCUSSION

The meta-analysis by Cénat et al. (2021) indicates that since the COVID-19 pandemic has broken out, the population-wide prevalence of depression, anxiety, insomnia, post-traumatic stress disorder, and psychological stress has risen markedly. In Greece (Lakioti et al., 2020) found that positive psychology concepts are useful variables in the mental health professionals’ resilience to work stressors.

As the article by Gilbody et al. (2021) points out, the mental health research community has been successful in describing the nature of the impact of COVID-19, but less so in generating solutions and providing clinical trial data to establish what works to mitigate the effects of COVID-19 impacts. It is necessary to analyze this imbalance and promote clinical trial studies to promote well-being, prevent emotional problems, and carry out early detection and intervention of emotional disorders. We suggest employing interventions to promote resilience in families (Sánchez-Hernández et al., 2022). We also reflect on the need for the emotional self-care of mental health professionals in the context of a pandemic through the daily practice of gratitude exercises involving “three good things that happened to me.”

## AUTHOR CONTRIBUTIONS

ÓS-H carried out mainly the section Promotion of Resilience in Families in the Face of Confinement in the COVID-19 pandemic. MB-S and RB mainly carried out the section Emotional Self-Care Of Mental Health Professionals. The rest of the sections have been carried out by the three authors. All authors contributed to the article and approved the submitted version.

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# The Relationship of Breathing and COVID-19 Anxiety When Using Smart Watches for Guided Respiration Practice: A Cross-Sectional Study

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COVID-19 mortality rates are increasing worldwide, which has led to many highly restrictive precautionary measures and a strong sense of anxiety about the outbreak for many people around the world. There is thus an increasing concern about COVID-19 anxiety, resulting in recommending approaches for effective self-care. From a positive psychology perspective, it is also important for people to have positive affect when dealing with this pandemic. According to previous literature, respiration is considered to be an effective way to enhance people's mental health. Among all the wearable devices, Apple Watch has the largest market share, so this study recruited Chinese users that use respiration exercise function on Apple Watch; a total of 316 valid data were retrieved. Meanwhile, to understand one approach related to using Apple Watch to practice respiration to reduce COVID-19 anxiety about being infected during the COVID-19 outbreak, this study used a web-based cross-sectional survey to examine anxiety about being infected by COVID-19 among Chinese people who had been using the Apple Watch to practice respiration during the period of the COVID-19 outbreak. The study was based on the Health Theoretical Model, and the model was developed with four dimensions and was validated with structural equation modeling. The results of this study showed that practicing few minutes had a positive relationship on positive attitude, and positive attitude had a negative relationship on pandemic anxiety and a positive relationship on continuance use intention. Anxiety about the pandemic had a negative relationship on the intention to continue using the function. This showed that respiration practice can help to suppress the increase in anxiety levels regarding this pandemic.

**Keywords:** Apple Watch, continuance intention, COVID-19 anxiety, guided respiration practice, positive affect, positive psychology

## INTRODUCTION

Coronavirus infection cannot be differentiated geographically, racially, religiously, or politically and is therefore considered a global problem (Moghanibashi-Mansourieh, 2020). The COVID-19 outbreak forced many countries to quarantine, isolate, and restrict travels of their citizens to reduce potential exposure to the infection (Luis et al., 2021). In addition, the occurrence of COVID-19 and its quick spread has worsened anxiety in the global population and led to mental health disorders in individuals due to the unpredictable nature of the virus causing a continuous stressful environment (Zandifar and Badrfam, 2020). In addition, Moghanibashi-Mansourieh (2020) found that approximately one in five people experience severe and very severe anxiety. Residents of provinces with higher rates of COVID-19 infection had greater levels of anxiety, and people who score highly on threat assessments tend to overestimate the severity and likelihood of adverse events and perceive themselves as particularly vulnerable to threats (Taylor, 2019). There is no doubt that the COVID-19 epidemic has put pressure on people and society, and fear of infection has been widespread during the outbreak (Choi et al., 2020).

One study noted that the COVID-19 pandemic has impacted individuals' mental health. To cope with the stresses and negative emotions and to seek the ability to survive and overcome this psychological harm, it is necessary to develop a positive attitude (Ardhiani et al., 2021). Many approaches have been suggested to train positive attitudes and to prevent psychological anxiety about being infected by Covid-2019 (Michels et al., 2021). For example, a few studies have focused on respiration practice to reduce COVID-19 anxiety about being infected or on positive attitude training (Ardhiani et al., 2021). Thus, the present study explored how people practice respiration using a smartwatch device.

Wang et al. (2020) investigated the psychological reactions of the Chinese community during the COVID-19 pandemic and found that 53.8% of respondents reported moderate to severe negative psychological effects from the outbreak. Therefore, there is an increasingly urgent need to understand the mental health impact of the COVID-19 pandemic in order to best prevent the occurrence of severe mental illness as a secondary consequence (Cullen et al., 2020). However, people are increasingly worried about the anxiety associated with COVID-19, suggesting the need for effective self-care and providing more mental health treatments (Peteet, 2020). Research suggests that staying mindful can help cope with stressful situations such as the one currently being experienced in this study. Respiration tends to be associated with a variety of psychological factors that can prevent emotional distress in chronic illness (Conversano et al., 2020). Moreover, some studies have shown several benefits of practicing respiration such as reducing anxiety, stress, depression (Khoury et al., 2015), and negative emotions (Sedlmeier et al., 2012), and fostering psychological well-being (Gaspar et al., 2021) and a positive attitude (Seema and Sircova, 2013). Attitude is defined as individuals' affect, cognition, and behaviors. According to the expectancy-value theory, attitude arises according to a person's belief about certain objects (Kato et al., 2016). Due to COVID-19, people

are suffering from social alienation and isolation. Therefore, how respiration practice affects people's positive attitude and anxiety about their health was of interest in this study.

Respiration is categorized as a method of emotion regulation, and it is believed that the processes that occur in respiration practice regulate difficult emotions that in turn contribute to physical health (Wielgus et al., 2020). In respiration practice, breathing is an exercise, relaxation, and contemplative practice, which is a respiration-based intervention that is similar to mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT; Monteiro et al., 2015). Guided respiration therapy is based on the principle of integrating breathing and relaxation self-regulation (Lalande et al., 2016), which actively changes breathing behavior and sustained intensity, and thus manages the dynamic interplay of physiological and psychological processes while minimizing discomfort or cathartic expressions and increasing engagement (Lalande et al., 2017). Paying attention to the breath requires one to shift attention to the sensation of breathing and to be aware of it at all times (Chittaro and Vianello, 2016). Thus, this study aimed to explore how respiration practice *via* Apple Watch can improve positive attitude, reduce anxiety about being infected by COVID-19, and boost continuance use intention of guided respiration practice with Apple Watch.

Recently, digital software for respiration practice, including smartwatch applications (apps), has become widely available (Lau et al., 2020). The important difference between app-based respiration practice is self-directed practice, different from in-person training, which is less expensive, more time saving, and more engaging (Economides et al., 2018). On the other hand, the advantages of a respiration app include its flexibility, mobility, and ease of use, which may facilitate the probability of its use by more people (Wen et al., 2017). However, little studies have examined the effectiveness of respiration apps (Mani et al., 2015). Other studies have stated that tracking wearable devices is a trend of today's leisure activities (Lidynia et al., 2018), which might lead to different using behavior such as how individuals adopt, use, and continue to use such devices (Canhoto and Arp, 2017). This would suggest that wearables may not be as sustainable as they may seem (Fietkiewicz and Ilhan, 2021). Therefore, it is important to determine consumers' continuance use intention of Apple Watch for guided respiration practice. To fill this research gap, this study used a web-based cross-sectional survey to examine the perceptions of COVID-19 anxiety among Chinese people who had been using Apple Watch for guided respiration practices (for more than 6 months), their positive attitude after respiration practice, and their continuance use intention of Apple Watch for guided respiration practice during the COVID-19 pandemic.

## METHODOLOGY

### Apple Watch Assists in Practicing Respiration

According to the statistical analysis of the International Data Company IDC Corporate USA (2021), Apple's sales of wearable devices reached 151.4 million in FY2020, accounting for 34.1%

of the market, and the market share of the second largest company's products was only 11.4%, which is sufficient to show Apple's representativeness as a research tool. In addition, the Apple Watch offers the potential to collect and return data from individuals to provide real-time personalized feedback through the wearable's screen (Abt et al., 2018), so this should be a suitable tool for data collection. In addition, Health and respiration are software developed by Apple and built into iPhone and Apple Watch, respectively. Respiration practice on Apple watch is a software developed by Apple in 2016 and is listed as one of the indicators of mental health by Apple. Therefore, this software was used as a research tool in this study.

On the iPhone's Health app, respiration practice time can be set as 1–5 min for the Apple Watch, and the app will ask users to focus on their breathing. In addition, the duration of breathing can be set based on inhalation and exhalation. The default value is seven times a minute, and when users breathe in, the watch face image will be enlarged and the watch will vibrate (vibration can be adjusted on users' phone). In this way, a record will be completed. When viewing the Health app, the number of minutes of "respiration" will be recorded. In order to have a calm mind at all times, users can set the duration of respiration practice on their phone, as shown in **Figure 1**.

## Research Model and Hypotheses

### Research Model

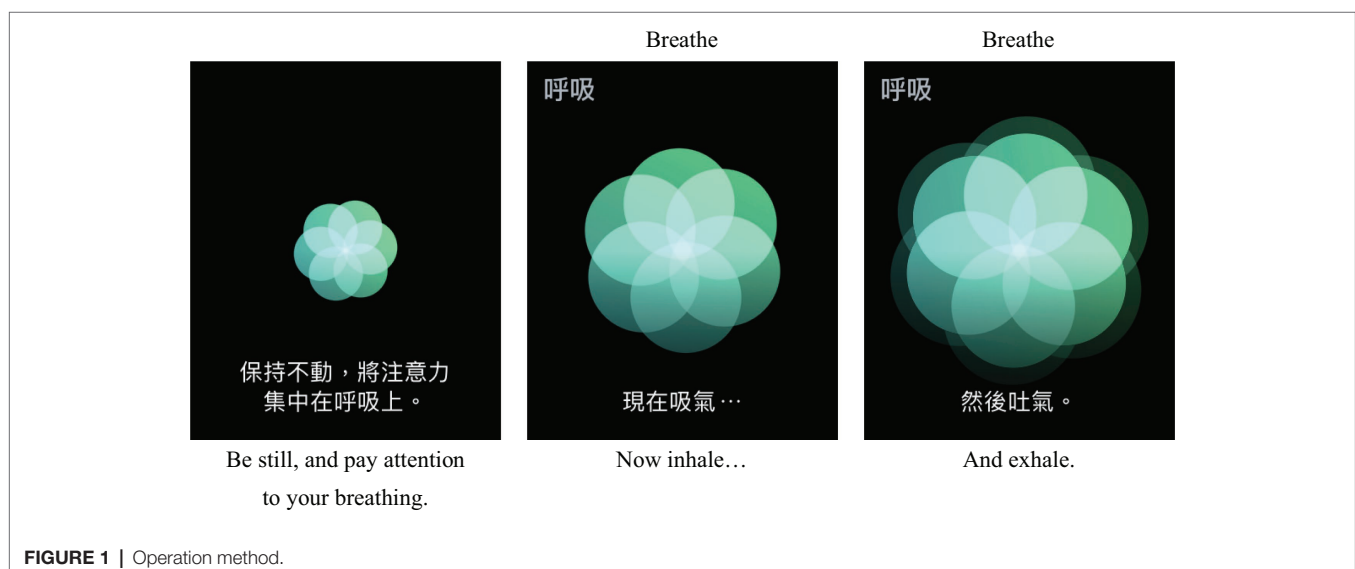
The Health Theoretical Model (HTM; Moskowitz et al., 2019) of the positive thinking pathway suggests that when people engage in positive activities in positive psychological interventions (PPI), they increase the duration of positive emotions, thereby decreasing the production of negative emotions, and increase their engagement in preventive health behaviors. Therefore, based on this concept, this study proposed four hypothetical paths and constructed a research model, as shown in **Figure 2**.

### Research Hypotheses

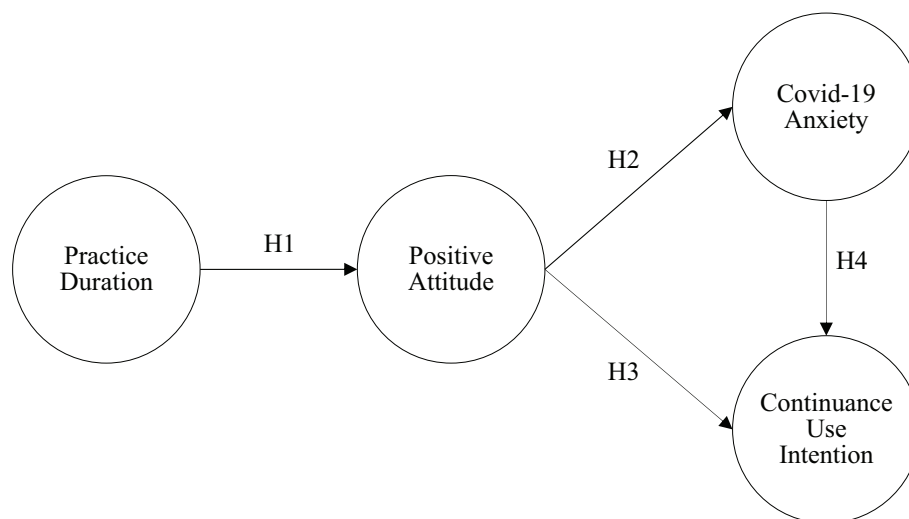
Self-care can be an important personal health asset to reduce the negative effects of stress caused by this condition and to help improve/maintain health (Bermejo-Martins et al., 2021), and self-care is considered an important and valuable principle because it emphasizes the active role of people in maintaining their own well-being (Martínez et al., 2021). In this study, respiration exercises were considered as a form of self-care. For example, a study has found that when performing positive interventions (especially for long periods of time) is strongly associated with an increase in positive self-attitude (Xiao et al., 2017). It is notable that some studies have proven that respiration have many positive outcomes such as reducing stress (Shearer et al., 2016; Pascoe et al., 2017) reducing perceived pain (Creswell et al., 2019), improving concentration (Norris et al., 2018), improve work memory (Mrazek et al., 2013), and improving one's emotions (Davis and Hayes, 2011). In addition, there is evident that practice duration in respiration is highly associated with positive attitude (Bravo et al., 2018). Therefore, the following hypothesis is as follows:

*Hypothesis 1:* Practice duration has a positive relationship on positive attitude.

The COVID-19 pandemic has paralyzed people in 216 countries (regions) around the world in all aspects of life, causing panic, insecurity about life and death, fear of infection transmission, and so on is leading the field of psychology to study the power and potential of human beings as an integral part of our well-being, adaptation, adjustment, and accommodation to any adverse situation in life (Kulandaiammal, 2020). Positive psychology practices and interventions are designed to develop strengths, skills, and resources to prevent the onset of mental disorders, build resilience, and help people lead better lives (Kern et al., 2020). Among other things, guided respiration practices are considered mostly effective in terms







**FIGURE 2 |** Research model.

of regulating emotions, because just observing and avoiding judgment can separate individual's emotions, which frequently further intensify emotional responses (Guendelman et al., 2017).

There is evidence that practicing respiration reduces harmful health behaviors (Salmoirago-Blotcher et al., 2013) and can improve mental behavior (Gawande et al., 2019; Schuman-Olivier et al., 2020). Studies have also found that having a positive attitude helps people fight anxiety and will lead them out of their darkest times (Chundawat, 2018). Another study related to attitude, anxiety, and practices related to COVID-19 among Jordanian University students found that students had positive attitudes toward COVID-19 anxiety (Olaimat et al., 2020); what this implies is that individuals' positive attitude may prompt them to adopt preventative behaviors (Roy et al., 2020; Torales et al., 2020). Given that respiration practices can improve individuals' positive attitudes toward COVID-19 anxiety, it could be the key to controlling anxiety. Therefore, the following hypothesis was proposed:

*Hypothesis 2:* Positive attitude has a negative relationship on COVID-19 anxiety.

Studies have noted that attitudes can be identified as positive or negative beliefs about a product, as a result of having direct experiences of the product (Amoroso and Lim, 2017). Oliver (1980) proposed a cognitive theory in which he argued that an individual's behavioral intentions can be conceptualized through attitudes. According to the Technology Continuous Theory (TCT), attitude is the main driver of users' continuous desire (Daragmeh et al., 2021). Previous studies have also indicated that users are found to have a positive attitude when they believe that the technology they use will improve their productivity (Chau and Hu, 2001). Attitude has been found to be a strong determinant of continuance intention (Black, 2005) and other studies related to technology have also confirmed that attitude has a strong impact on continuance use intention

(Amoroso and Ogawa, 2011; Cheng, 2011). Therefore, the following hypothesis was proposed:

*Hypothesis 3:* Positive attitude has a positive relationship on the desire for continuance use intention.

Anxiety is found especially during pandemic, and this may influence individuals' behavior (Roy et al., 2020). This behavior includes users receiving tailored analyses of their health status and physical activity, so health-seeking users are increasingly self-measuring. We therefore hypothesized that high self-quantifiers will become more attached to the technological devices on their wrists (Siepmann and Kowalczyk, in press). Individuals with higher anxiety about COVID-19 will have a negative affective reaction toward technology use due to their anxious feelings, and their anxiety will weaken their continuance use intention (Venkatesh, 2000). Having high anxiety leads to a decrease in sensory and motor systems (Xue et al., 2012), which makes it harder for individuals to use Apple Watch for guided respiration practice. In other words, when people do not feel less anxious after using respiration app, they may be less inclined to continue using it. Therefore, the following hypothesis was proposed:

*Hypothesis 4:* COVID-19 anxiety has a negative relationship on continuance use intention.

## Data Collection

Participants were recruited using a snowball sampling method, and the questionnaire link and QR code were distributed to community members on social media, Weibo, and WeChat (the most popular messaging app in China) who shared their daily positive thoughts and growth, so that all Chinese using WeChat or other social networking tools could see the survey. On the first page of the online questionnaire, this study first

explained the purpose, the object for filling in the data, the purpose of the data, and anonymous information. Although this is a self-reported experience, we believe that those participants willing to assist had performed guided respiration practice *via* smartwatches for more than 6 months. When participants completed the survey anonymously, they were encouraged to forward the link to others they knew. Data were collected from 1 to 30 November 2020. In the data collection process, the focus of this study was on those who had at least 6 months of experience in respiration exercises. Therefore, people who subjectively perceive whether they are anxious or not were confirmed through *post-hoc* statistical analysis that Covid-19 anxiety patients were not included in this study.

## Participants

A total of 374 questionnaires were collected in this study. In the 374 collected data, when the participant completing in the questionnaire within 3 min or when the answers to the questions were outliers in the same dimension, this study questioned the validity of these data, so the 58 data that belonged to these criteria were deleted, resulting in a valid sample size of 316, with a valid recall rate of 84.5%. There were 132 male participants (41.8%) and 184 female participants (58.2%). There were 140 respondents (44.3%) aged 20 or older but under 30, 58 (18.4%) aged 30 or older but under 40, 77 (24.4%) aged 40 or older but under 50, and 41 (12.9%) aged 50 or older.

## Instruments

Confirmatory factor analysis (CFA) is the best choice for investigating the structural validity of the scale when there are strong theoretical assumptions about the scale structure, and CFA can be used to identify the general structure of the instruments (Raju et al., 2002). This study was a quantitative validation study in which data were collected through the questionnaires (positive attitude, COVID-19 anxiety, and continuance use intention) and was developed from the concepts of previous studies and reviewed by 3 positive psychology experts to confirm the face validity of the questionnaires. The expert review was conducted in three phases: the first phase of the review focused on the appropriateness and completeness of the design of the vector and its topics, and suggested corrections; the second phase of the review focused on the readability of the revised topics and suggested corrections; and the third phase of the review focused on the fluency of the revised topics and suggested corrections. Finally, five users who had used the Apple Watch's respiration practice were asked to take a trial reading of the scale. The questionnaires content was measured on a five-point Likert scale (1–5 for strongly disagree to strongly agree).

## Positive Attitude

A positive attitude is a guide to living a positive life, so preserving a positive attitude from the ups and downs will be vital in all aspects of life (Chundawat, 2018). Based on the above concepts, this study developed a construct of positive

attitude with nine questions to measure the degree of positivity of participants' attitude in response to different negative events. For example, "When I face a setback, I have to overcome it in a different way" and "When things get tough in my life, I think it's time for me to grow more."

## COVID-19 Anxiety

The main purpose of this study was to examine participants' perceptions of anxiety about COVID-19, and participants assessed their experience of this specific anxiety on the basis of COVID-19 (Lee, 2020). Based on the above concepts, this study developed the construct of COVID-19 anxiety, with eight items, where each item was completed to investigate the unique manifestation of this particular form of anxiety, in order to measure participants' perceptions of anxiety about being infected during the COVID-19 epidemic. For example, "I am concerned that I may have been infected as a result of the spread of the epidemic" and "I would be worried that I might be infected sooner or later, as in the case of the current outbreak."

## Continuance Use Intention

By wearing a smartwatch continuously, users can benefit from the available features as it encourages them to lead healthier lifestyles (Siepmann and Kowalczyk, in press). With this concept in mind, the present study adapted the Product Continuance Intention Scale designed by Hong et al. (2017) with six items to measure the participants' intention to continue using the smartwatch for guided respiration practice. For example, "In the future, I would like to use a smartwatch to assist in the practice of respiration" and "I would like to continue to use my smartwatch in the future when it has new content for respiration exercises."

## Practice Duration in Minutes

The number of practice duration used in this study is the average number of minutes over 6 months' participants used guided respiration practice *via* Apple Watch. These data were obtained from the average number of minutes of "respiration practice" recorded in the participant's "health app," as provided by the participant. The results will be calculated in mean (number of minutes) of weekly practice for the participants and minimum value in minutes and a maximum value in minutes of practice will be included. In addition, this study will also indicate the mean value (minutes) and SD (minutes) of participants that practice respiration.

## Data Analysis and Procedures

This study adopted Structural equation modeling (SEM) for the study model validation to investigate the relationship between positive attitude, COVID-19 anxiety, continuance use intention, and practice duration in minutes. In general, each SEM analysis will go through the steps of model specification, data collection, identification, parameter estimation, data-model fit assessment, model estimation, and model evaluation, but there may be a need for model modification (Mueller, 1997; Lei and Wu, 2007). Based on this statistical convention, this study collected data by

modeling and formulating research hypotheses through literature and theory, and then coded and organized the data. Item analysis was used to confirm the fit of each dimension in sequence, and then reliability and validity analysis is carried out. After confirming that the dimension has good reliability and validity, the fit of the research model is carried out. In addition, when the model had a good degree of fit, model validation was then conducted, and the complete validation analysis results are as follows.

## Item Analysis

The item analysis in this study was conducted using first-order confirmatory factor analysis. Hair et al. (2019) suggested that the  $\chi^2/df$  value should be less than 5, the RMSEA should be less than 0.10, and the GFI and AGFI should be higher than 0.80. Those items with a factor loading lower than 0.50 should be deleted from the original questionnaire; after the first-stage CFA, the deletion result of positive attitude was that the number of items was reduced from nine to seven; COVID-19 anxiety was reduced from eight to seven; and continuance use intention was reduced from six to five (Table 1). The factor loadings of the deleted items ranged from 0.59 to 0.79, and the  $t$ -values ranged from 13.61 to 19.81, which met the criteria proposed by Green and Salkind (2004).

## Reliability and Validity Analysis

The internal consistency Cronbach's  $\alpha$  value of 0.78–0.90 and the composite reliability value of 0.78–0.90 exceeded the value of 0.70 suggested by Hair et al. (2019), indicating that the constructs had good reliability. The factor loadings ranged from 0.65 to 0.85 and Average Variance Extracted from 0.42 to 0.56, which met the criteria proposed by Fornell and Larcker (1981). When the CR value is greater than 0.6 and AVE is higher than 0.4, it indicates that the construct has validity (Table 2).

## RESULTS AND DISCUSSION

The data of this study were analyzed by item analysis, reliability and validity analysis, to confirm the construct validity. The model fit analysis was analyzed to confirm the suitability of the model, and then carry out model verification.

## Model Fit Analysis

In order to confirm the suitability of the model, statistical experts recommend that the  $\chi^2/df$  value should be less than

5 in the model fitness analysis (Hair et al., 2019), the RMSEA value should be less than 0.10, GFI, AGFI, NFI, NNFI, CFI, IFI, and RFI values should be greater than 0.80 (Abedi et al., 2015), and PNFI and PGFI equivalents should be greater than 0.50 (Hair et al., 2019). The fitted index values for this study were  $\chi^2=250.9$ ,  $df=167$ ,  $\chi^2/df=1.50$ , RMSEA=0.04, GFI=0.93, AGFI=0.91, NFI=0.90, NNFI=0.96, CFI=0.97, IFI=0.97, RFI=0.89, PNFI=0.79, and PGFI=0.74.

## Path Analysis

Model validation results show that had practice duration had a positive relationship on positive attitude ( $\beta=0.35^{***}$ ;  $t=5.64$ ); positive attitude had a negative relationship on COVID-19 anxiety ( $\beta=-0.38^{***}$ ;  $t=-5.53$ ); positive attitude had a positive relationship on continuance use intention ( $\beta=0.60^{***}$ ;  $t=6.90$ ); and COVID-19 anxiety had a negative relationship on continuance use intention ( $\beta=-0.23^{***}$ ;  $t=-3.56$ ), as shown in Figure 2. The explanatory power of practice duration for positive attitude was 12% and  $f^2$  was 0.14; The explanatory power of positive attitude for COVID-19 anxiety was 15% and  $f^2$  was 0.18; The explanatory power of positive attitude and COVID-19 anxiety on continuance use intention was 0.52% and  $f^2$  was 1.08, as shown in Figure 3.

## Analysis of Practice Duration in Minutes

In this study, descriptive statistical analysis of guided respiration practice was conducted using SPSS 23.0 for Windows. The results of the analysis showed that the mean number of minutes of weekly practices for the participants in this study had a minimum value of 10min and a maximum value of 60min, with a mean value of 34.92min and a SD of 12.50min, as shown in Table 3.

## Discussion

Any new pandemic has the potential to cause considerable anxiety, and although, similar to other stressor emotions, pandemic-related anxiety may disappear without any intervention, more intensive interventions should be offered to people suffering from severe pandemic disease-related anxiety (Choi et al., 2020). However, at this critical time, it is essential that anxiety be managed in a positive manner (Goodwin et al., 2020) to address pandemic-related mental health problems. Therefore, maintaining people's mental health is an important part of the fight against COVID-19 anxiety (Dubey et al., 2020). Several studies have shown that when performing positive intervention such as respiration

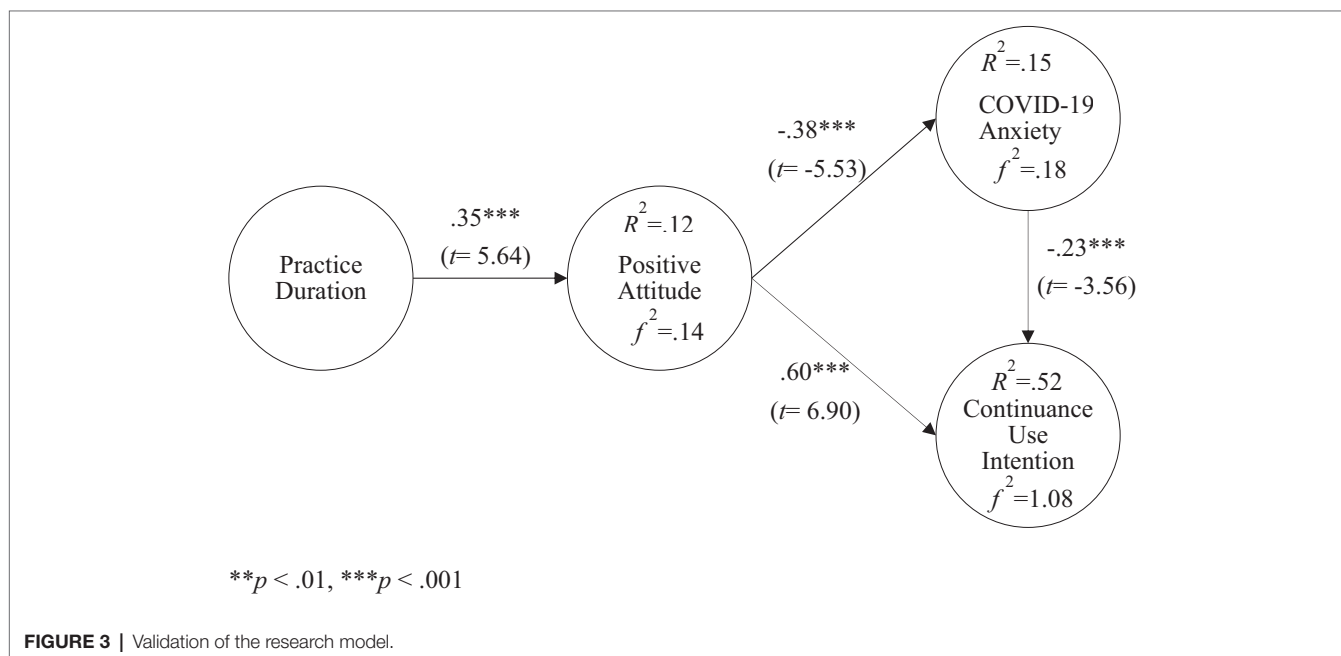
TABLE 1 | First-order confirmatory factor analysis (CFA).

Index	$\chi^2$	$df$	$\chi^2/df$	RMSEA	GFI	AGFI	FL	$t$
Value	—	—	<5	<0.10	>0.80	>0.80	>0.50	>3
Positive attitude	33.5	14	2.39	0.07	0.94	0.94	0.59–0.70	13.61–16.52
COVID-19 anxiety	28.8	14	2.06	0.06	0.99	0.98	0.68–0.79	16.80–19.81
Continuance use intention	5.7	5	1.14	0.02	0.99	0.98	0.59–0.71	16.40–18.45



**TABLE 2 |** Reliability and validity analysis.

Construct	<i>M</i>	<i>SD</i>	$\alpha$	<i>FL</i>	<i>CR</i>	<i>AVE</i>
Positive attitude	3.71	0.61	0.84	0.65	0.84	0.42
COVID-19 anxiety	3.19	0.81	0.90	0.74	0.90	0.56
Continuance use intention	3.45	0.71	0.78	0.64	0.78	0.43

**TABLE 3 |** Analysis of the average number of weekly practices in minutes.

Construct	Minimum value	Maximum value	Mean	SD
Practice duration	10	60	34.92	12.50

for a period of time is positively related with individuals' positive attitude practicing respiration can help improve individuals' positive attitude (Xiao et al., 2017). These positive attitude includes improvement or maintaining health (Bermejo-Martins et al., 2021), maintaining well-being (Martínez et al., 2021), reducing stress (Shearer et al., 2016; Pascoe et al., 2017), reducing perceived pain (Creswell et al., 2019), improving concentration (Norris et al., 2018), and improving one's emotions (Davis and Hayes, 2011). This study is consistent with previous studies and has shown that practice duration may improve individuals' positive attitude (Bravo et al., 2018).

This study found that respiration practices can improve individuals' positive attitudes toward COVID-19 and that it is key to controlling anxiety. This study echoes a previous study which found that individuals with higher positive attitude had lower anxiety (Chundawat, 2018). Therefore, positive attitude

plays an important role in COVID-19 anxiety as stated in previous studies, where authors found that health professionals with higher positive attitudes towards pandemics will show lower levels of anxiety (Olaimat et al., 2020). Moreover, this study found that participants who used Apple Watch for guided respiration practice had positive attitudes, which implies that they found that respiration practice via Apple Watch improved their attitude (Chau and Hu, 2001).

Previous study has showed that individual can perceive positive or negative attitude toward a product after experiencing the product (Amoroso and Lim, 2017). This implies that individuals' behavioral intention can be conceptualized through attitude (Oliver, 1980). Therefore, attitude is the one of the main drivers of users' continuous desire (Daragmeh et al., 2021). In addition, this study echoes with previous studies which found that attitude had a strong impact on continuance intention (Black, 2005; Amoroso and Ogawa, 2011; Cheng, 2011). Thus, the participants of this study have positive attitude in using Apple Watch for guided respiration and are willing to continue using the product.

A study by Wang et al. (2020) indicated that 53.8% of the Chinese people surveyed had moderate to severe negative psychological effects. In the present study, the respondents showed moderate levels of COVID-19 anxiety ( $M = 3.19$ ,  $SD = 0.81$ ). In addition, previous studies have suggested that

respiration-based psychological training can be an effective intervention (Conversano et al., 2020), and previous studies have also demonstrated that respiration can reduce anxiety, and suggested the need to develop and implement appropriate respiration-based therapeutic interventions (Dubey et al., 2020). In addition, changes in mental health outcomes were largely dependent on the duration of app use, with those who used the respiration app more frequently during the 30 days of free access demonstrating the greatest effectiveness in terms of respiration and, to a lesser extent, anxiety states (Flett et al., 2019). This study also found that the more frequently people used Apple Watch for respiration practice, the lower their perceived levels of COVID-19 anxiety, suggesting that the results of this study echo those of previous research.

It is interesting to point out that COVID-19 anxiety has a negative relationship on continuance use intention. This could be because, for an individual to practice respiration, relaxation, and contemplative practice is required (Monteiro et al., 2015). However, participants with higher anxiety about COVID-19 might have a negative affective reaction toward technology use; this is due to anxious feelings and anxiety that weakens their continuance use intention (Venkatesh, 2000). This result can also be deduced from the fact that people do not feel less anxious after using the respiration app, which makes them less willing to continue using it.

## CONCLUSION AND RECOMMENDATIONS

### Conclusion

This study is a cross-sectional study in which causality may not be confirmed, but this study uses a validated factor analysis to elucidate the correlation between potential user influences and the measured variables. Therefore, at the peak of the epidemic, a questionnaire was administered to users who had been using the Apple Watch for 6 months to perform guided respiration practice to understand the subjective perceptions of these users.

Based on the above this study also confirmed that, within the framework of HTM, practice duration had a positive relationship on positive attitude. Positive attitude had a negative relationship on COVID-19 anxiety and a positive relationship on continuance use intention. COVID-19 anxiety had a negative relationship on continuance use intention regarding the feature. The contribution of this study is that the use of Apple Watch for guided respiration may help with stress during COVID-19 pandemic. The guided respiration practice was shown to have positive benefits on psychological states during the COVID-19 pandemic.

In addition, Wearable health technologies (WHT) in the form of smartwatches show promise for improving people's mental health as they promote health based on autonomy while also providing quantitative data that allow people to quickly read their exercise information and other physiological information [e.g., heart rhythm, respiratory rate, and

electrocardiography (ECG)]. Therefore, after using the smartwatch for guided respiration practice, users can also get more health information from the recorded information.

### Implications

Apps allow people to practice respiration anywhere, and they can also help beginners learn different types of respiration without spending a great deal of time or effort. Past research has found that respiration apps are effective in terms of reducing symptoms of anxiety. Also, as with many new therapies, there is growing interest in using wearable devices for mental health. Therefore, this study indicated that during the COVID-19 pandemic, the Apple Watch could be used to facilitate guided respiration practice that is convenient and available anywhere. It is also the first study to demonstrate the benefits of using a wearable smart watch to guide respiration with respiratory practice for positive psychology.

In addition, although the use of self-reporting tools and social expectations may influence the results, the validity of using online data collection was also confirmed in this study by conducting hypothesis testing through structural equation modeling under the influence of pandemic where it is difficult to invite participants to conduct physical experiments. Therefore, the use of self-reported data versus online data collection during a pandemic remains a compromise solution.

### Limitations and Future Study

In this study, three new questionnaires were developed and compiled, and although the statistical results have good reliability and validity, this study is a validated factor analysis study and it is not possible to know how inferable these three subquestionnaires are. Therefore, in the follow-up study, it is suggested that the same mature instrument can be used as a calibration validity study, and the reliability and validity of the three questionnaires can be compared with each other for participants from different countries.

As this study features a self-reported survey study conducted during the outbreak which was not conducted in an experimental setting, future studies may collect data from real respiration practice in a lab experiment to explore how the lab practice environment effects on respiration. Future research can compare this study with experimental studies to see if the two different types of study results are the same.

When recruiting participants for this study, emphasis was placed on those with at least 6 months of experience in breathing exercises, and there was no restriction on whether people were subjectively perceived as anxious or not. Therefore, in future studies, if the results of this study are to be revalidated, it is suggested that the study design can be divided into two phases. In the first phase, participants with high levels of anxiety were recruited through an instrumental assessment, and in the second phase, the experimental manipulation of time series analysis should be used to further understand the causal relationship between respiration exercises in Apple Watch and these constructs.

In addition, because we adopted an online participant recruitment method, it was not possible to actually meet the participants, making it easy to have participant attrition. This study therefore used a one-time cross-sectional survey method, but future studies can conduct longitudinal research to determine changes in participants' levels of anxiety perception.

## 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.

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## AUTHOR CONTRIBUTIONS

Y-FW, M-YC, J-HY, J-CH and J-NY: concept, design and drafting of the manuscript. J-HY, J-CH and J-NY: acquisition of data and statistical analysis. Y-FW, M-YC and Y-TW: critical revision of the manuscript. All authors contributed to the article and approved the submitted version.

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# Online Emotional Support Accompany Group Intervention and Emotional Change of the Public During the COVID-19 Pandemic: A Multi-Period Data Analysis From China

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COVID-19 has made it difficult to adopt traditional face-to-face psychological intervention under this situation because of the blocked down and social distancing, which brings big psychological crisis to the public among the global. To explore the emotional change of the public in China at the outburst of the pandemic at different phases, to establish an online working platform and create a new model of an online intervention to hold public emotions under pandemic, and test its effectiveness, so to give advisement for government emergency management system. We established an online organization to work for this program and innovated a model of online group counseling with online emotional support accompany group (OESAG) right after the outburst of a pandemic. We analyzed 53 OESAGs from February 10 to April 9, including 555 application forms, 253 feedback from members, and 139 feedback from group leaders by using NVivo and SPSS to explore the evolution and characteristics of public emotion during COVID-19 and the effectiveness of OESAG. Our results showed that the emotional changes of members ranged from shock to depression to positive. The public's emotions swiftly changed from stress, anxiety, and isolation, to the hope of returning to work or finding a job during the pandemic with the help of OESAG. OESAG has effectively regulated the negative emotions of members by conducting psychological crisis intervention to provide members a space to communicate with each other, especially the female and frontline staff. Policy makers can set up an online systematic psychological crisis intervention system as soon as possible to make up for the lack of psychological assistance in the emergency management system.

**Keywords:** COVID-19, social distancing, emotional distress, online emotional support accompany group, psychological crisis intervention

## INTRODUCTION

The corona virus disease 2019 (COVID-19) pandemic was a big and quick-hit that affected almost every aspect of the daily life of the public. While a lot of people lost their lives, others have been quarantined and kept a social distance from others. Many people have thus reported feelings of rejection, isolation, panic, and depression (Naqvi, 2020; Taylor et al., 2020b), and some have even committed suicide (Elbogen et al., 2020). These are all causes of mental health problems (Li et al., 2021; Xu et al., 2021), psychological crisis (Abir et al., 2021; Pérès et al., 2021), and even PTSD (Budden, 2009; Fenster et al., 2018), which may, in turn, bring an unstable society and potential decrease in productivity. Psychotherapy is very important under this pandemic, but it is also difficult to perform traditional in-person psychological interventions. Also, individual psychotherapy fails to meet the huge demand. Thus, a model of online group psychotherapy needs to be innovated.

There is evidence of widespread emotional distress in response to the COVID-19 pandemic. On February 10, February 18, and March 8, 2020, the number of people infected with the COVID-19 pandemic in China was 37,626, 74,185, and 80,735, and the cumulative number of deaths was 1,016, 2,004, and 3,119, respectively. Although the increase in the number of infections has declined, the cumulative deaths are still increasing, and this may cause a psychological crisis for the Chinese public. Data from China, for example, suggests that 25% of the general population has experienced moderate to severe levels of anxiety- or stress-related symptoms in response to COVID-19 (Qiu et al., 2020; Wang et al., 2020). Likewise, there is evidence of considerable distress specific to COVID-19. Indeed, several investigators have reported elevated levels of fear of infection (Ahorsu et al., 2020; Lee and Neimeyer, 2020; Mertens et al., 2020), as well as an elevated prevalence of posttraumatic stress disorder (Tan et al., 2020). Recent research based on data collected in the early stages of the COVID-19 epidemic from a large American and Canadian population-representative sample suggests that epidemic-related distress may comprise a network of five interconnected symptom categories—danger and contamination fears, socioeconomic concerns, xenophobia, traumatic stress symptoms, and compulsive checking and reassurance seeking—corresponding to a COVID stress syndrome (Taylor et al., 2020a,b).

In response to the psychological crisis brought by the COVID-19 pandemic to the public, there have been some psychological crisis intervention studies (Brouzos et al., 2021). However, there is no social-psychological service guarantee mechanism in the emergency management system of China. The emergency management life cycle can be divided into four parts: disaster prevention and mitigation, emergency preparedness, emergency response, recovery, and reconstruction. Emergency response has attracted the attention of the government and the public (Kong and Sun, 2021). As an important part of emergency response, psychological intervention and assistance have not received enough attention in China. This is not conducive to the recovery of the public psychological crisis during and after the pandemic.

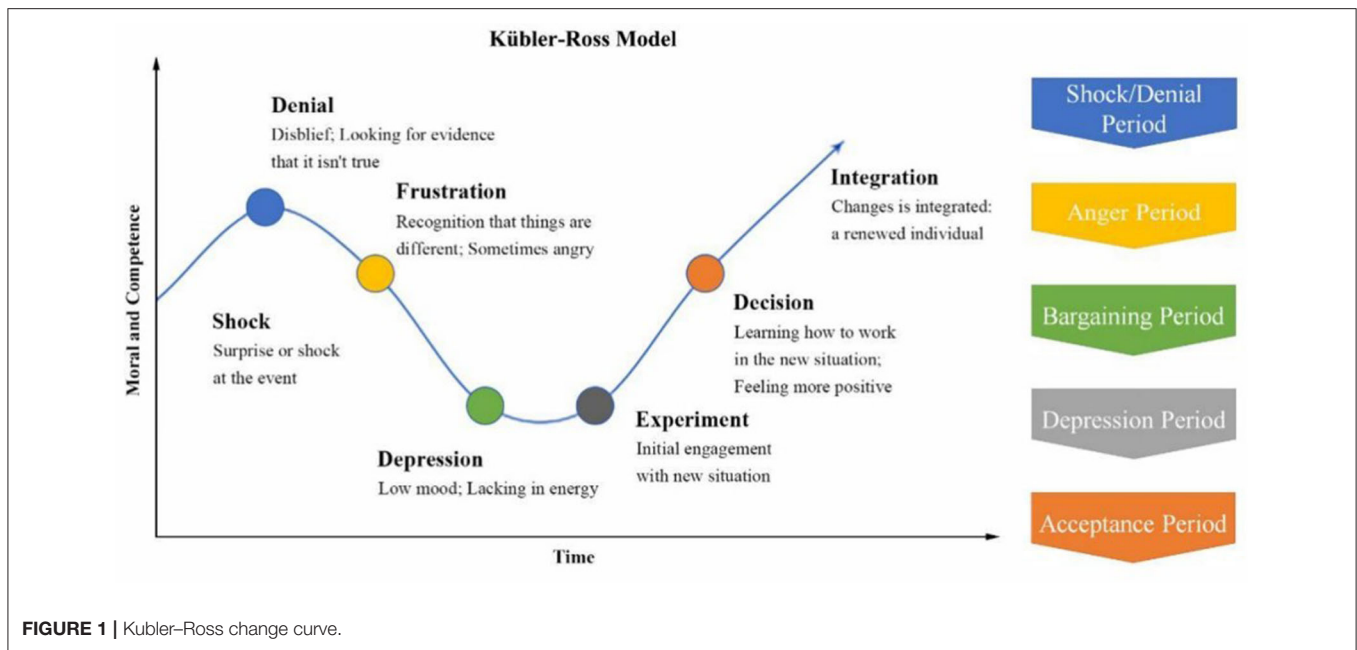
Therefore, we have designed the online emotional support accompany Group (OESAG) to make up for the lack of psychological intervention and psychological assistance in the emergency management system of China. By providing virtual space for members who are our psychological crisis intervention object to share their emotions, they are able to see and be seen by themselves and others to support each other and get feedback to make them feel connected, supported, safe, and secure, and they can be empowered to endure the vulnerability under pandemic. OESAG was created right after the pandemic and got provided to the public during the pandemic; emotional data before and after the group psychotherapy was also got collected to describe the emotional change of the public and intervene in emotional distress during the pandemic. Furthermore, we would improve the effectiveness of OESAG in psychological crisis intervention during COVID-19 by using the triangulation method which combines qualitative analysis, quantitative analysis, and case analysis.

## LITERATURE REVIEW

### Emotion and Psychological Crisis

There is no single definition of emotion. According to Oxford English Dictionary, emotion is a mental state (Michel, 2002). Emotion differs in the positive–negative dimension and can be divided into different categories of emotions such as interest, enjoyment, sadness, anger, fear, etc (Izard, 2009; Izard et al., 2011). In order to adapt to changes in the environment, people's emotions are constantly changing, and when stimulated by changes in the external environment, people's emotions are activated (Levenson, 1999). COVID-19 is a public health emergency of international concern that has caused a huge psychological crisis (Elbogen et al., 2020; Brouzos et al., 2021). A psychological crisis refers to an individual encountering an event or situation that has a significant psychological impact and cannot effectively cope with it using existing psychological resources. It may cause an imbalance or dangerous state in cognition, emotion, body, or behavior (Everly and Mitchell, 2000). The occurrence of major emergencies, including COVID-19, whose transmission methods are complicated and fast-changing, has caused panic and powerlessness among the public to a large extent. The mental health of the public has been greatly affected by psychological crises or even psychological diseases emerging in some areas (Tang et al., 2020; Abir et al., 2021).

Kubler–Ross has proposed the Kubler–Ross Change Curve which explains people's psychological changes in the face of major changes. As shown in **Figure 1**, Kubler–Ross Change Curve has divided people's psychological changes after encountering major changes into five periods. The periods include shock/denial period, anger period, bargaining period, depression period, and acceptance period. Following the Kubler–Ross Change Curve, we divide psychological crisis intervention under the COVID-19 pandemic into three stages: the emotional holding stage, the mental health repair stage, and the future development education stage.



## Psychological Crisis Intervention

Psychological crisis intervention refers to assisting the individual or groups who suffered from a psychological crisis in short term, thus preventing or reducing the potential negative effects of psychological trauma on the individual under the guidance of psychological theory (Everly and Boyle, 1999). The widespread applications of modern group psychological counseling started with the counseling of post-war soldiers during World War II (Terr, 1992). Group counseling is widely used in psychological counseling for children and youth groups who have experienced disasters such as earthquakes and hurricanes (Grolnick et al., 2018). This activity has a significant effect on post-disaster mental health (Austin and Godlesk, 1999). Small group intervention can have long-term effects or reduce either Post-traumatic stress disorder (PTSD) or acute stress disorder perse (De Gaglia, 2006; Newman et al., 2014; Fu and Underwood, 2015; Ali, 2020).

As a social species, humans require a safe and secure social environment to survive and thrive (Hawkey and Cacioppo, 2010), therefore, having access to supportive and affiliative relationships with others is crucial (Pérès et al., 2021). Evidence has shown that supportive relationships have a wide range of positive benefits. Supportive and affiliative relationships are physiologically and psychologically regulating, as they bring security to our world by activating affect systems associated with safety and soothing (Cacioppo et al., 2015).

Compared with other emergencies, besides panic, anxiety, fear, etc., the major lifestyle changes brought by COVID-19 is that the public must wear masks and isolate themselves at home to reduce infections. This has brought along interpersonal alienation and a perceived feeling of isolation, resulting in social environments characterized by a high degree of (social) threat (Cacioppo et al., 2011). Being deprived of supportive relationships due to perceived loneliness

(Hawkey and Cacioppo, 2010), ostracism or social exclusion (Williams, 2007), social isolation (Cacioppo et al., 2011), and rejection (Gerber and Wheeler, 2009) are associated with negative consequences. A lack of social connectedness is even associated with increased morbidity and mortality (Shiovitz-Ezra and Ayalon, 2010), thus it compromises the integrity of physical and mental health and wellbeing (Hawkey and Cacioppo, 2010).

Facing the psychological crisis caused by COVID-19, Chinese psychologists pioneered the creation of a compound model mental health intervention system that divides objects and hierarchies, and vigorously advocated network intervention methods (Zhong et al., 2020). In particular, online group psychological intervention is critical to crisis intervention (Mitchell et al., 2009; Brouzos et al., 2021). Telemental health using network or other technological options has been suggested as a practical and efficient alternative for psychological crisis intervention (Holmes et al., 2020; Brouzos et al., 2021), especially for those who are more vulnerable to COVID-19 (Courtet et al., 2020).

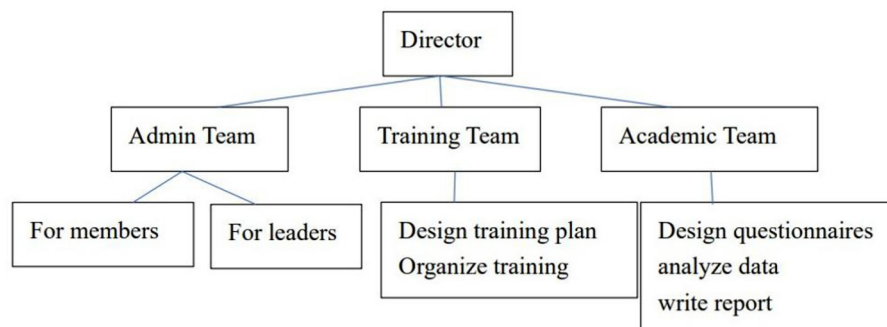
In conclusion, although some existing literature have studied the problem of online psychological intervention during COVID-19, the scope of the population involved is small and it is still in the experimental stage, whose timeliness is poor for the sudden and fast-spreading COVID-19. Therefore, we established and launched an online intervention model which covered the whole country and multiple groups such as medical staff and police.

## STUDY DESIGN

### Online Working Platform and Staff

Because we were all locked down at home, so we established an online working platform and organized a staff team





**FIGURE 2 |** Staff team structure.

for this program, by combining the WJX (a platform that can easily design questionnaires and collect data), Official WeChat, WeChat group, and the Zoom. In this way, we could stay at home and recruit staff members, train group leaders, recruit members, do online group counseling, and collect feedback, all could be done *via* the internet.

A brochure was published by the Official Wechat, which was that any individual who felt stressed during this pandemic can apply for this service, they can click the QR code on the brochure and fill out an application form. After submitting the application form, they will be redirected to scan another QR code which will bring them into a WeChat group, where they can get information about how to receive OESAG service, they will get another QR which will collect their feedback after the group session.

To do this program, we need different people to do different tasks, we first listed the tasks, such as drafting a recruitment brochure, inserting the application form into WJX and creating a QR code, inserting the QR code into the brochure, publishing the brochure on the official WeChat to recruit group members, design training course to train qualified group leaders, do the administrative job for group members and group leaders, design questionnaires and analyze the data, write an academic report, etc.

People should first confirm that they are not in an active psychosis state before they apply.

We structured the staff team according to the tasks as **Figure 2**. Members referred to those who participated in the OESAG. Leaders referred to the group counselors, whom we call group leaders.

## Measures

We designed the members' application form, member feedback questionnaire, and a group-leader feedback questionnaire. The application form was used to analyze the emotional change of the public during COVID-19, and the feedback form of members and leaders was used to help us explore the effectiveness of OESAG from two perspectives of members and leaders, respectively.

## Members Application Form

This form asks for the member's name, gender, age, occupation, location, and what brings him/her to this group. The applications are collected before they enter the group.

## Member Feedback Questionnaire

The feedback questionnaire is designed around emotional expressions, mutual support, subjective stress state, etc. It includes certain questions like members' goal achievement, gains, what's helpful, future expectations, and more. The feedback are collected after each group.

## Group-Leader Feedback Questionnaire

The feedback questionnaire is designed around group effectiveness (emotional linkage, resource extension, listening, security, emotional catharsis, emotional transition) and group leaders' intervention. It includes questions such as what did you do during this group, what are the issues that appeared in the group, how is the focus member, and how do you think the goal achievement? The feedback are collected after each group.

## Procedure

OESAG is designed to provide a space for members to share their emotions and get support from each other. It is meant to help members transform their emotions and get the power to face uncertainty and helplessness as well as regain control. This group model, innovated by us, lasts for 60 min comprised of the following four to five steps:

- (1) Group leaders introduce themselves in a sentence, introduce the setting of the group, including the purpose of the group, what can (and cannot) be provided by the group, the issue of confidentiality, and will ask for members' thoughts. A secure group climate with clear boundaries can thus be set up in this way. This last for about 10 min.
- (2) A meditation exercise such as meditation music or relaxation to relax members to cross the boundary from daily life into the group. This step is optional. A group leader can decide whether to do this according to the group dynamics. This last for about 5 min.
- (3) Group leaders invite members to talk about their experience during the past 1 month, especially a typical story, the story

**TABLE 1** | Sample and data of the OESAG.

Data resource	First period (2.10–2.17)		Second period (2.18–2.29)		Third period (3.8–4.9)	
Number of groups	8		24		21	
	Application form	Feedback form	Application form	Feedback form	Application form	Feedback form
Group members	84	54	227	119	261	80
Group leaders		9		57		73

can be a family story, or workplace story, around their emotions, thoughts, behavior, interpersonal interactions, etc. Each member has 3 min to share their story in a sequence of names on the screen. This last for about 30 min. If the focus member appeared, the group leader can decide to extend this step to take care of this focus member, to avoid hurting this focus member.

- (4) Group leaders invite each member to give feedback to another member on what he/she heard and appreciated, like “I heard your story, I appreciated you for your ...” In this way, members help each other to find their own power. This last for about 15–20 min.
- (5) Members will reflect on their experiences, and the group leaders will end the group. This last for about 10 min.

## Data and Methods

The data of this paper came from the public welfare project, “Psychological Services for Psychological Rehabilitation Groups under the COVID-19 Pandemic Situation” and has received strong support from Professor Fumin Fan of Tsinghua University and Beijing Normal University. We established OESAG to conduct psychological crisis intervention for the public during the COVID-19 pandemic. The project was conducted between February 10 to 17 (phase one), 2020, February 18 to March 1 (phase two), and March 8 to April 9 (phase three). OESAG was conducted *via* the online working platform we established. A total of 53 groups were recruited. A total of 481 persons have applied to participate, among them 440 have gotten the offer, 346 of them have participated, and 253 members along with 139 group leaders have sent their feedback. All the data are listed in **Table 1**.

NVivo (Version 12.0, Qualitative analysis software, QSR International, Melbourne, Australia) and SPSS (Version 22.0, IBM, USA) are used for data analysis. We analyzed the application forms at three periods to understand the emotional change of the public during the COVID-19 pandemic and analyzed the feedback forms to explore the effectiveness of OESAG by triangular mutual printing methods which included qualitative analysis, quantitative analysis, and case analysis. Specifically, we used NVivo 12 to analyze the feedback forms of group members and leaders to explore the effect of OESAG on public psychological crisis intervention by extracting high-frequency words from responses to the feedback forms of group members and leaders, used SPSS 22 to explore the reliability and validity of the feedbacks of group members and leaders, and used the case analysis to further confirm the results of the qualitative analysis and quantitative analysis.

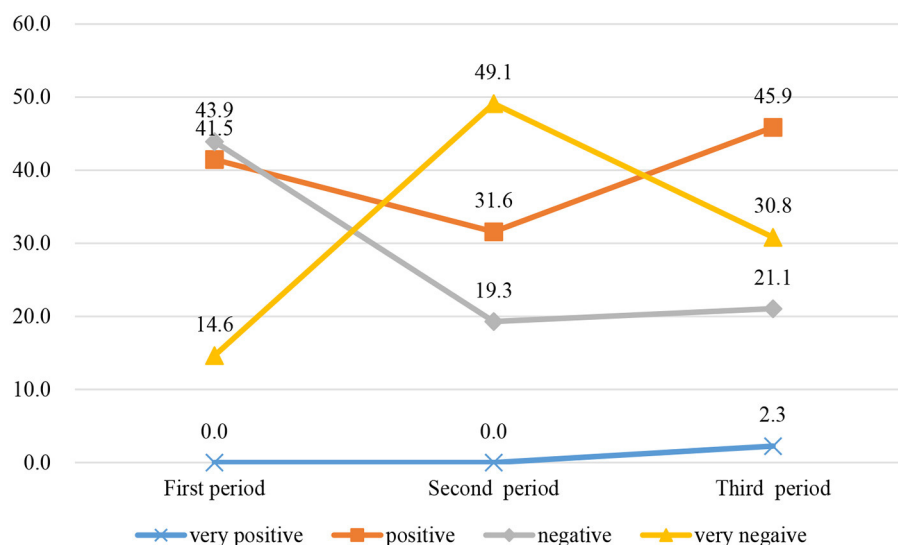
## RESULTS AND ANALYSIS

Using NVivo to qualitatively analyze the 572 application forms, 253 member feedback, and 139 group-leader feedbacks, we explored the evolution and characteristics of the public emotional change during the pandemic as well as the effectiveness of OESAG.

### Public Emotional Change During the Pandemic

COVID-19 rapidly spread in China in February 2020 when we established OESAG to deal with the psychological crisis caused by COVID-19. In the application form, we divide the emotions of group members into these four categories: very positive, relatively positive, relatively negative, and very negative, and the members will evaluate and choose according to their own situation. Based on the application forms submitted by group members, we have analyzed the public emotional changes during the COVID-19 pandemic. **Figure 3** shows the evolution of group members’ emotions in three periods. In the first period, the proportions of members with very positive, relatively positive, relatively negative, and very negative emotions were 0, 41.5, 43.9, and 14.6%, respectively. Compared with the first period, the members with very negative emotions in the second period have greatly increased. This is consistent with the Kubler-Ross change Curve. As the pandemic gradually stabilized, the life, work, and study of the member also gradually returned to normal. Compared with the second period, the number of members with positive emotions in the third period has greatly increased, and members with negative emotions have decreased.

We further analyzed the mentality trajectories of group members in the COVID-19 pandemic with an analysis of the demands of group members to participate in OESAG. **Table 2** presents the demands of group members in OESAG in three periods. The recruitment time of the first and second phases is close, and the members’ demands for the group were relatively similar. The members had more needs for “support,” “company,” “anxiety,” “relieve,” etc. The demands of the members in the first period focused on the work stress caused by the pandemic, so they were more willing to establish connections with others in hopes of obtaining company and psychological support from OESAG. OESAG can help members relieve anxiety and provide professional psychological support advice. In the second period, “support” and “company” were still the main demands of the members, and their anxiety had increased significantly. Compared with the first period,



**FIGURE 3 |** The evolution of group members' emotions in three periods.

**TABLE 2 |** The demands of group members at three periods.

Order	First period			Second period			Third period		
	Word	Frequency	Weighted percentage	Word	Frequency	Weighted percentage	Word	Frequency	Weighted percentage
1	Support	25	5.05	Support	35	5.58	Psychology	32	2.53
2	Company	14	3.37	Company	25	3.99	Support	39	2.53
3	Psychology	11	2.64	Anxiety	22	3.51	Work	31	2.45
4	Anxiety	11	2.64	Relieve	18	2.87	Study	28	2.22
5	Relieve	11	2.64	Psychology	15	2.39	Relieve	25	1.98
6	Development	12	2.52	Study	13	2.07	Stress	24	1.90
7	Pandemic	10	2.40	Experience	13	1.99	Pandemic	24	1.90
8	Work	9	2.16	Understand	13	1.75	Development	34	1.87
9	Stress	6	1.44	Listen	10	1.59	Anxiety	22	1.74
10	Professional	5	1.20	Pandemic	9	1.44	Emotional adjustment	22	1.74

members in the second period mentioned “understand” and “listen,” expressing their desire to have listened to and to relieve anxiety through OESAG. As the pandemic gradually stabilized, the demands of the prospective members changed significantly in the third period, and “work” began to become the main topic of concern for the members again. The recovery of online work and part of offline work increased the sense of reality for members and their work stress caused by the pandemic was alleviated. As the public gradually returned to normal work or looked for new jobs, the demands for “psychological support,” “relieve stress or anxiety,” and “emotional adjustment” were apparent.

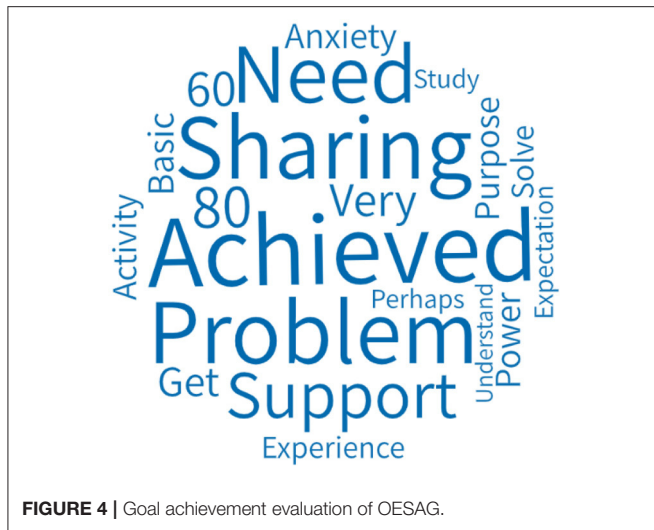
In conclusion, the evolution of group members' emotions and the changes in the demands of group members during the three periods indicated the importance of prompt intervention in the first period of the pandemic.

## Effectiveness of OESAG

### Qualitative Analysis

We analyzed 253 members' feedback forms over three periods from the aspect of goal achievement evaluation of OESAG. **Figure 4** shows the word cloud of the goal achievement evaluation of OESAG. The key words are achieved, sharing, problem, support, need, etc. Most group members believe that OESAG's expected goals are basically achieved, and the completion degree is between 60 and 80%. They think that their emotions have been vented and they have found strength by helping each other, listening, and communicating with the leadership of group leaders. However, because of the lack of time and other factors, the achievement was not 100%.

We analyzed the feedback forms from 130 leaders of the latter two periods from four aspects. They include themes of OESAG, group dynamics of OESAG, the psychological crisis of



focus members, and goal achievement evaluation of OESAG. The leaders' feedback form in the first period is relatively simple and is different from that of the latter two periods, so we did not conduct a word cloud analysis on the leaders' feedback for the first period.

**Figure 5A** shows the word cloud figure of the themes of OESAG. The key words for OESAG's themes are pandemic, anxiety, self, stress, study, life, etc. Since people can only stay at home due to the pandemic, there were anxiety and pressure on their lives, studies, and work. On the one hand, people are threatened by the pandemic and had a sense of panic; on the other hand, because of the pandemic, they had to stay at home, which was inconvenient to their daily life, study, work, etc. Some people may even lose their jobs. Therefore, they needed a platform to talk and vent their emotions so that they can receive emotional support from others.

**Figure 5B** presents the word cloud figure about the group dynamics of OESAG. The main words are cohesion, relationship, support, sharing, conflict, etc. During the pandemic, people stayed at home and faced conflicts in various aspects such as family relations, study, work, etc. By guiding the group members to share their own experiences and emotions, the leaders gave them a sense of security in the group to break through the psychological defense and resistance between members, thus establishing a relationship of mutual trust, safety, and stability. Furthermore, the group was able to form a cohesive force and strong group dynamics to ensure the achievement of group goals.

**Figure 5C** shows the word cloud figure of the psychological crisis of focus members. The key words are work, anxiety, sharing, pandemic, support, women, etc. Leaders also focused on describing the focus members, especially female focus members, who suffered a greater psychological impact from the outbreak as well as higher levels of stress, anxiety, and depression (Wang et al., 2020). They found that the pandemic not only brought anxiety to members' work or study, but also great challenges to front-line staff (such as teachers, police, community workers,

psychological counselors, and civil servants) whose emotions are also in need of attention (Zhang et al., 2021).

**Figure 5D** presents the goal achievement evaluation of OESAG. The key words are achieved, support, company, sharing and get, etc. Most leaders believed that the goals of OESAG have basically been achieved. Group members had enough time to speak and share their own feelings and experiences, thus a link through mutual listening, companionship, and support was formed to relieve the tension caused by the pandemic. However, there are also a few leaders who thought that OESAG had some problems. The problems include lack of group dynamics, not enough participating members, and separation of individual members. These are aspects that we need to think through and improve on in the future.

### Quantitative Analysis

In order to prove the effectiveness of OESAG, we conducted a reliability and validity analysis of the feedback of group members and leaders on goal achievement in three periods. Corresponding questions about the goal achievement received in OESAG are set in the feedback questionnaires of group members (the emotional link between members, resources presented by the group, etc.) and leaders (the degree of goal achievement, emotions have been vented, etc.). The specific questions are tabulated in **Tables 3, 4**. And the options are very incompatible, incompatible, and very incompatible, and members or leaders can choose the corresponding options according to their conditions.

**Table 3** shows the reliability and validity analysis of members' goal achievement in the group. Each item's coefficients of Cronbach's alpha are all above 0.8, and the total coefficient of Cronbach's alpha is 0.880, which is also above 0.8, indicating that the reliability effect is very good. In addition, the Kaiser–Meyer–Olkin (KMO) is  $0.830 > 0.6$  (Kaiser and Rice, 1974), and the significance level of Bartlett's test of sphericity is  $\text{Sig} = 0.000 < 0.050$ , indicating that the significance test (Pett et al., 2004) was passed and the validity was proven to be good. In summary, the good reliability and validity once again prove that members had basically achieved their goals. Members have received support and interpersonal links, their stress has been relieved, and their emotions have been vented through OESAG.

**Table 4** shows the reliability and validity analysis of leaders' goal achievement in the group. Each item's coefficients of Cronbach's alpha are all above 0.7, and the total coefficient of Cronbach's alpha is 0.744 which is also above 0.7, indicating that the reliability effect is quite good. In addition, the Kaiser–Meyer–Olkin (KMO) is  $0.702 > 0.6$  (Kaiser and Rice, 1974), and the significance level of Bartlett's test of sphericity is  $\text{Sig} = 0.000 < 0.050$ , indicating that the significance test was passed (Pett et al., 2004) and the validity is good. In conclusion, the good reliability and validity once again prove that the leaders had basically achieved their goals in OESAG.

In addition, due to the difference in the content of the feedback questionnaire for the third and first two periods, we analyzed the feedback form for the third period separately. Based on the data of the third period, we used SPSS to analyze the group effectiveness evaluation of the group members and leaders to further verify the effectiveness of OESAG.





**FIGURE 5 |** The feedback of group leaders. **(A)** Themes of OESAG. **(B)** Group dynamics of OESAG. **(C)** Psychological crisis of focus members. **(D)** Goal achievement evaluation of OESAG.

**TABLE 3 |** Reliability and validity analysis of members' goal achievement.

Items	Reliability		Validity		<i>p</i>
	Single	Total	KMO	Bartlett	
Emotional link between members	0.856	0.880	0.830	299.246	0.000
Resources presented by the group	0.864				
Members' listening to each other	0.870				
Members' sense of security in the group	0.871				
Emotional venting of group members	0.850				
Emotional transformation of group members	0.842				

**Table 5** shows the effectiveness evaluation of 80 group members on OESAG. The items of effectiveness evaluation include: "I was very close to other members in the group," "I had new discoveries and learning in the group," "I was being listened to carefully by other members in the group," "I felt very safe in the group," "My emotions in the group were vented," "I became more positive after joining the group". The ratio of group members who believed that these items were "consistent to very consistent" is 66.25, 90, 92.5, 82.5, 86.25, and 88.75%. The remaining members believed that these items were either

"not sure, inconsistent, or very consistent," which is a minority. Therefore, we can see that most of the group members had a positive evaluation of OESAG and believed that they have gained a lot from OESAG.

**Table 6** shows the effectiveness evaluation of 36 group leaders on OESAG. The items of effectiveness evaluation include: "Members had new discoveries and learning in the group," "Members listened carefully to each other," "Members felt very safe in the group," "The emotions of the members in the group were vented," and "Members became more positive". The ratio

**TABLE 4 |** Reliability and validity analysis of leaders' goal achievement.

Items	Reliability		Validity		<i>p</i>
	Single	Total	KMO	Bartlett	
The degree of goal achievement	0.738	0.744	0.702	429.910	0.000
Emotions have been vented	0.741				
Pressure has been reduced	0.733				
Feel no longer alone	0.731				
Get the company and support of your peers	0.724				
Regain control	0.744				
Instill good hope	0.726				
Group atmosphere helps relieve stress	0.726				
Groups help to channel emotions	0.720				
Get the company and support of peers in the group	0.728				
Establish good interpersonal links	0.722				
Help build confidence	0.713				
Full of hope	0.717				

**TABLE 5 |** Effectiveness evaluation of members on OESAG (*N* = 80).

Items	Evaluation				
	Very inconsistent	Inconsistent	Not sure	Consistent	Very consistent
I was very close to other members in the group	4 (5%)	11 (13.75%)	12 (15%)	36 (45%)	17 (21.25%)
I had new discoveries and learning in the group	3 (3.75%)	2 (2.5%)	3 (3.75%)	41 (51.25%)	31 (38.75%)
I was listened carefully by other members in the group	3 (3.75%)	2 (2.5%)	1 (1.25%)	39 (48.75%)	35 (43.75%)
I felt very safe in the group	4 (5%)	4 (5%)	6 (7.5%)	34 (42.5%)	32 (40%)
My emotions in the group were vented	3 (3.75%)	4 (5%)	4 (5%)	47 (58.75%)	22 (27.5%)
I became more positive after joining the group	4 (5%)	1 (1.25%)	4 (5%)	47 (58.75%)	24 (30%)

**TABLE 6 |** Effectiveness evaluation of leaders on OESAG (*N* = 36).

Items	Evaluation				
	Very inconsistent	Inconsistent	Not sure	Consistent	Very consistent
Members had new discoveries and learning in the group	0 (0%)	2 (5.56%)	0 (0%)	20 (55.56%)	14 (38.89%)
Members listened carefully to each other	0 (0%)	0 (0%)	0 (0%)	19 (52.78%)	17 (47.22%)
Members felt very safe in the group	0 (0%)	1 (2.78%)	2 (5.56%)	20 (55.56%)	13 (36.11%)
The emotions of the members in the group were vented	0 (0%)	0 (0%)	1 (2.78%)	23 (63.89%)	12 (33.33%)
Members became more positive	0 (0%)	1 (2.78%)	2 (5.56%)	17 (47.22%)	16 (44.44%)

of group members who believed these items were “consistent to very consistent” is 94.45, 100, 91.67, 97.22, and 91.66%, which are all above 90%. These data indicate that most of the group leaders have a positive evaluation of OESAG and believe that OESAG has a positive effect on group members by effectively addressing their psychological crisis of members.

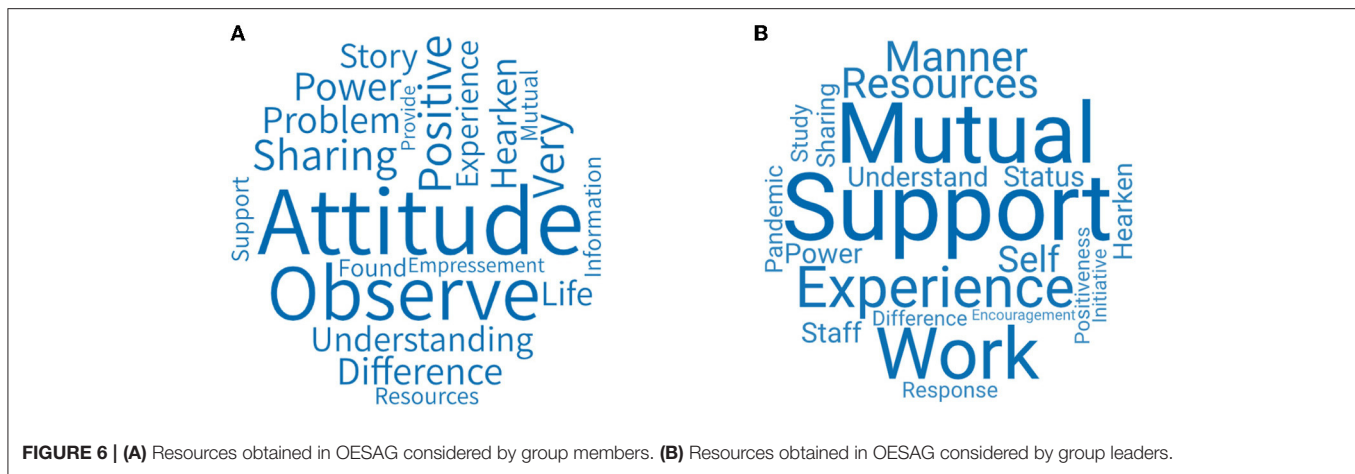
### Case Analysis

After analyzing the reliability and validity of the feedback from group members and leaders, we used the cases of our program to further confirm the effectiveness of OESAG on public psychological crisis intervention.

In the first and second periods, the purpose and appeals of group member recruitment are mostly brief. They include “reducing anxiety and easing emotions” (Case 01SD-XMY), “can be listened to and supported, and reap personal growth” (02GD-YLC). In contrast, the personal appeals of the members of the third period are more complete, and it is easier for the leader to discover them as the focus members. We conducted a case analysis of member 03BJ-XHJ in the third period.

The personal appeal described by member 03BJ-XHJ before entering the group is described as:

*“In interpersonal relationships, when you feel your own bad emotions, such as getting along with people you don’t like, being*



*hurt by language, being snatched away by others, and facing them. In this situation, how can I protect myself from harm. Leave no psychological shadow on myself and help myself grow.” (Case 03BJ-XHJ)*

The member 03BJ-XHJ cited the influence of multiple negative situations such as “getting along with people you do not like,” “being taken away by others,” and “being hurt by language,” but you “also need to face them,” which fully manifests his/her shock, frustration, and anger. In the feedback after OESAG, the member 03BJ-XHJ felt “listening, and I felt that I was being cared for and concerned with, and this promoted the smooth progress of everyone’s communication. At the same time, the leaders woke us up from asking questions about anxiety to paying attention to what should be done, which also woke me” (Case 03BJ-XHJ). This is a reflection of the process of the member being paid attention to and building trust with the group. “Pay attention to everyone and allow them to speak and maintain a good communication atmosphere” (Case 03BJ-XHJ). This engages the members to start self-exposure, and members feel that “it is very necessary for everyone to communicate together as their own problems will appear smaller in the group, and the power of the group is great” (Case 03BJ-XHJ). In addition, the member 03BJ-XHJ also found that “there is something beyond my reach. Although there is no answer yet for my own question, I was able to start thinking on my own and needs to be completed by myself” (Case 03BJ-XHJ), which is an explanation of self-effort and a manifestation of loneliness. But on the whole, this is an integrated new individual, “it can make other members speak louder and stronger” (Case 03BJ-XHJ). This shows that a powerful new individual wants to make a sound.

Moreover, the leader of the group also reported that member 03BJ-XHJ’s “self-awareness” is critical. This was listed as one of the focus members. The leader believed that the group where the member 03BJ-XHJ belongs “will soon establish a mutually supportive relationship” and “shows a strong cohesion.” The sharing of the group has led to changes in the members who reacted negatively at the beginning of the group.

## Mechanism of OESAG

In response to the question “what do you think are the resources obtained during the group process,” we further analyzed the feedback of group members and leaders to explore the mechanism of OESAG to promote emotional regulation.

**Figure 6A** shows the word cloud for the resources obtained in OESAG considered by the group members. The key words include attitude, positive, experience, observation and understanding, etc. The word that the members mentioned the most is “attitude”—that is, OESAG provided members with the emotions and attitudes of other members facing life and grief during the pandemic. In addition, they believe that their companions had opened up their hearts, sincerely communicated with each other and that their support for each other had also given them hope and positive strength.

**Figure 6B** shows the word cloud figure of the resources obtained in OESAG considered by group leaders. The key words include support, mutual, experience, sharing, work, etc. The main resource provided by OESAG is a platform for group members to establish connections with each other. Leaders guide group members of different professions to share their own stories, and to listen, support, and encourage each other. This way, they can perceive their own and others’ attitudes and statuses when dealing with the pandemic. In addition, professionals will conduct further targeted assessments and provide emotional counseling services for group members.

## DISCUSSION AND CONCLUSIONS

COVID-19 has demanded unprecedented actions regarding the delivery of mental health services to the public. The provision of face-to-face group psychotherapy was unavailable because of the self-quarantine. The rapid deployment of virtual online group psychotherapy services for the public under COVID-19 stress was imperative given their level of psychiatric need.

OESAG was an effective modality of group psychotherapy under the pandemic. It can provide a secure virtual space for the public to express their anxiety, depression, fear, and disappointment. They can also get support from other members

to alleviate their stress and recover from COVID-19 stress. OESAG provides a steady, convenient online communication platform for group leaders and members by combining Official WeChat, WeChat group, WJX, and Zoom. Group members can join a WeChat group by scanning the QR after they submit the application form. They can get the Zoom information in the WeChat group, then go into a Zoom room to get OESAG service. Compared with the traditional psychological crisis intervention, OESAG provides an efficient, cost-effective, viable, acceptable mental healthcare platform (Bolton and Dorstyn, 2015; Gentry et al., 2019). In addition, given that people must stay home due to COVID-19 and offline communication activities being unavailable, OESAG fully demonstrates the advantages of using modern information technologies such as WeChat, WJX, and Zoom to communicate remotely.

We first explore the mentality trajectories of the group members in the COVID-19 pandemic, then use SPSS 22.0 and NVivo 12.0 to explore the effect of OESAG on public psychological crisis intervention from two perspectives of qualitative and quantitative analysis, respectively, and finally carry out a case analysis, forming triangular cross-validation with qualitative analysis and quantitative analysis. Firstly, the mentality trajectories of members ranged from shock to depression to positive. As the pandemic gradually stabilized, “work” became the main topic of concern once gained for the public, and their stress or anxiety mainly came from returning to normal work or looking for a new job which is consistent with the Kubler-Ross Change Curve (Kubler-Ross, 1969). In addition, OESAG conducted psychological crisis interventions on group members through online methods which have effectively played a role in regulating the negative emotions of members. Due to COVID-19, people had to stay home and maintain a social distance from others. This exacerbated their feelings of rejection, anxiety, and depression (Naqvi, 2020; Taylor et al., 2020b), which may cause psychological crisis (Abir et al., 2021; Pérès et al., 2021). OESAG provides a platform for people during the COVID-19 pandemic to share their emotions and help them feel more positive and powerful. Moreover, female groups suffered a greater psychological impact from the outbreak as well as higher levels of stress, anxiety, and depression during COVID-19 (Wang et al., 2020). COVID-19 also brought great challenges to frontline staff such as medical staff. At the initial stage of the pandemic, the government had focused more on the mental health of patients and neglected medical staff (Ang et al., 2013). However, compared with the general public, they have more direct and long-term contact with patients with COVID-19, exposing them to a higher risk of contracting the pandemic (Montemurro, 2020) and thus more likely to experience negative emotions (Zhang et al., 2021). Furthermore, OESAG aims to eliminate or reduce the negative emotions caused by the COVID-19 pandemic by establishing emotional links between group members. Under the leadership and self-demonstration of group leaders, group members had communicated and shared with each other to form a mutually supportive emotional link to relieve stress, anxiety, or other negative emotions of members. Therefore, policy makers should establish a systematic psychological crisis intervention system and a supportive effect evaluation system as

soon as possible to give more attention to psychological crisis intervention for female and frontline staff.

This study has achieved quite much. First, we described the mentality trajectories of the public in China amid the COVID-19 pandemic and confirmed the Kubler-Ross Change Curve, which is from shock to depression to positive, and indicated the importance of prompt intervention at the beginning of the pandemic. Second, we have established a model of temporary organization for such an online program and innovated a model of online group counseling known as OESAG. This is a new internet platform to provide online group counseling that includes the WeChat official account, WeChat group, WJX software, and Zoom. Third, we examined the relationship between psychological stress alleviation and OESAG to provide big data for policy making of emergency intervention during and after the pandemic. We have also been able to provide suggestions to make up for the lack of psychological intervention and psychological assistance in the emergency management system in China.

However, OESAG also has its limitations. First, the control of time. Group members have given feedback that the communication was relatively short and it was not enough to fully share their emotions. Second, the number of members in each group should also be managed to avoid having too many or too few members in each group due to absence, late arrival, early leaving, etc. Third, the psychological crisis intervention for different groups lacks obvious pertinence. Finally, due to the sudden outbreak of the COVID-19 pandemic, the time of organizing OESAG is relatively urgent, so there is no systematization in the recruitment criteria, and everyone can apply.

Therefore, we think OESAG not only provides the function of the experiment but also provides the function of observation and treatment, so we will further establish a systematic platform so that it can be quickly activated to relieve the psychological crisis of the public after a major health incident. This way, we can help the public quickly log on to the platform and get the opportunity to share their own emotions, listen to others, as well as feel the link and support. We should begin by constructing a more structured program to better connect the various processes of the platform and train the leaders more efficiently. We should then aim to set a supportive group to provide people with space to express themselves, be listened to, and feel connected. In this way, the number of people will not be limited to just a consulting group. In addition, if there are enough psychological experts involved, we can establish a broad platform, so the intervention of large-scale government public psychological managers can be initiated in the future. Finally, we should also find ways to further improve the pertinence of psychological crisis intervention for different groups, such as frontline staff, the general public, and patients, 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 Ethical Review Board of Beijing Jiaotong University. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

XL, XW, and YZ worked on the study design and method. XL was responsible for manuscript design, data analysis, and article writing while XW, YZ, ZM, and SH supervised the analysis and put forward constructive comments on the article. TB and DT provided interpretive input and language corrections. All authors

contributed to this work, critically reviewed, and approved the final manuscript.

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# Three Mental Health Symptoms of Frontline Medical Staff Associated With Occupational Stressors During the COVID-19 Peak Outbreak in China: The Mediation of Perceived Stress and the Moderation of Social Support

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The outbreak of COVID-19 epidemic has increased work demands for medical staff and has a certain impact on their mental health. The present study aimed to examine the role of perceived stress and social support in explaining the association between the occupational stressors and three mental health symptoms (i.e., anxiety, depression, and insomnia) of frontline medical staff. Five hundred twenty five frontline medical staff were investigated online after the outbreak of the COVID-19 (16 February, 2020–2 March, 2020) in China. The results found that the prevalence of anxiety, depression, and insomnia among frontline medical staff were 39.8, 29.9, and 37.9%, respectively. Occupational stressors were associated with anxiety, depression, and insomnia symptoms. Perceived stress significantly mediated this link. Social support moderated the second half of the indirect effect of occupational stressors on anxiety and depression symptoms. Under the epidemic situation of COVID-19, for frontline medical staff, high perceived stress and low social support may increase vulnerability for mental health symptoms triggered by occupational stressors. Thus, improving the social support and promoting the cognitive reappraisal of perceived stress may help to maintain mental health among medical staff.

**Keywords:** COVID-19, frontline medical staff, occupational stressors, perceived stress, social support, anxiety, depression, insomnia

## INTRODUCTION

The World Health Organization (WHO) has declared the outbreak of coronavirus disease 2019 (COVID-19) a pandemic. The COVID-19 virus has spread in more than 220 countries, 5.9 million people have died of COVID-19 and more than 430 million have been infected by the end of 25 February, 2022 (WHO, 2022). In addition to many deleterious physical health impacts, COVID-19 has had dire consequences on the mental health of the world population (Reskati et al., 2021). Existing research has suggested that the psychosocial effects of COVID-19 are, most of the time, greater and more prolonged than its physical symptoms (Allsopp et al., 2019). This is especially evident for COVID-19 frontline medical staff who have worked tirelessly to mitigate its propagation.

Multiple studies have demonstrated that the elevation of work demands and the necessity to engage in greater and highly stressful work responsibilities have significant negative consequences on the mental health of frontline COVID-19 medical staff (Sanghera et al., 2020; Zaka et al., 2020; Bizri et al., 2021). However, several studies have also indicated that higher occupational demands do not always trigger mental health symptoms (Wang and Wang, 2019). Such observation has led to the recognition that the association between occupational stressors and mental health symptoms might be indirect. A dearth of research remains regarding resources that can mitigate the harmful effects of occupational stressors. Thus, the current study seeks to investigate the relationship between occupational stressors and mental health symptoms (i.e., depression, anxiety, and insomnia) of frontline medical staff at the peak of COVID-19 epidemic.

Social support is an essential social factor that can mitigate the negative effects of stress. Social support is associated with higher levels of positive mood, fewer health complaints, lower depressive symptoms, minimal sleep problems, and higher life satisfaction (Chen et al., 2009; Xiao et al., 2020). In this study, we focus specifically on whether social support can buffer the impact of occupational demands or stress on depression, anxiety, and insomnia symptoms respectively.

Therefore, the purpose of this study is to (a) establish associations among occupational stressors, perceived stress and mental health symptoms (i.e., depression, anxiety, and insomnia), (b) understand the underlying mechanisms behind these associations, and (c) demonstrate how social support can mitigate the link between occupational demands or stress and depression, anxiety, and insomnia symptoms respectively.

## Occupational Stressors and Mental Health Symptoms of Medical Staff

Occupational stressors refer to social and physical work-related circumstances that challenge the adaptive capabilities and resources of an employee. Occupational stressors may trigger one's stress response and cause psychological or physical health problems including negative emotions, sleep disturbances, and even cardiovascular disease, when one's personal coping resources are inadequate (Suleman et al., 2018). Medical

institutions are demanding occupational settings. High time pressure, varying workloads, and exposure to traumatic events may place strain on medical staff (Greenslade et al., 2020). Stressors within the medical institutions contribute to high levels of psychological distress and turnover (Walton et al., 2020). Research has shown that medical staff are usually exposed to more demanding and complex chronic and acute occupational stressors than the general population (Zaka et al., 2020; Galbraith et al., 2021).

Since the outbreak of COVID-19, medical institutions in China and even around the world are facing unprecedented challenges. Frontline medical staff have endured months of unimaginable accumulation of work demands, compounded with their own personal obligations in this unforeseeable global disaster (Kang et al., 2020). Their work-life balance which, in the medical field, pre-pandemic, is well-known to be marginally equitable (Ma et al., 2020), have been disproportionately jeopardized during this COVID-19 era.

Psychological distress is another major adverse consequence of the COVID-19 pandemic among the medical staff. A systemic review of the mental health of 69,499 health professionals worldwide at the onset of the COVID-19 from 436 published articles found about 14–45% experienced depression, 12–36% reported anxiety, 5–33% shared having acute stress symptoms, 7–34% met criteria for post-traumatic stress disorder (PTSD), 34–36% had insomnia, and 3–43% experienced occupational burnout (Sanghera et al., 2020). These studies shed valuable information of mental health problems in the high work environment of frontline medical staff. It also begs into questioning the triggering effect of occupational stressors on the mental health symptoms of medical staff. Furthermore, Moreno Fortes et al. (2020) surveyed 440 employees and found that occupational stressors had a significant reverse correlation with positive mental health. Other researchers also suggested that occupational stressors are a significant predictor of anxiety and depression (Mark and Smith, 2012; Wang et al., 2017). It thus seems reasonable to expect a significant link between occupational stressors and mental health symptoms among frontline medical staff during the COVID-19 pandemic.

**H<sub>1</sub>:** Occupational stressors is positively associated with mental health symptoms including anxiety (1a), depression (1b), and insomnia (1c).

## The Mediating Role of Perceived Stress

Despite the robust evidence that suggests an association between negative mental health symptoms and occupational stressors, there remains minimal understanding of how occupational stressors negatively influences mental health (Quick and Henderson, 2016; Williams, 2018).

The cognitive appraisal model of stress asserts that cognitive appraisal is the factor linking stressors to experienced distress, particularly, to mental and somatic symptoms. When exposed to stressors, an individual subjectively assesses the stressors (primary appraisal) and subsequently determines which coping resources can be applied to the situation (secondary



appraisal) (Harvey et al., 2010). If the individual appraises that their resources are sufficient to meet the demands of event, they will feel less strained. If the resources are not judged to be sufficient, stress will consume them (Carpenter, 2016). Therefore, it is not whether stressors lead to ill-health, but whether the individual perceives a situation as a threat or not (Harvey et al., 2010; Balieiro et al., 2011). Thus, the appraisal of the potentially stressful event plays an important role in the negative outcomes (Gustafsson and Skoog, 2012).

Perceived stress refers to the psychological response that an individual has after their cognitive evaluation of a stimulus as a threat. Perceived stress is one form of cognitive appraisal that may explain the link between occupational stress and mental health symptoms (Balieiro et al., 2011). Evidence suggests perceived stress have adverse and pessimistic effects on mental health, as measured by insomnia, depression, anxiety, and lower psychological well-being (Yin et al., 2013). In one study, stress perceptions were found to mediate the relationship between stressors and health-related quality of life (Rusli et al., 2008).

Furthermore, field quasi-experiments (Harvey et al., 2010) demonstrate that subjective appraisals of a situation appear to play an important role in stress responses, which have previously been shown to impair health. In line with this model and its supporting research, we presuppose that perceived stress may be one factor linking the association between occupational stressors and mental health symptoms (i.e., anxiety, depression, and insomnia).

**H<sub>2</sub>:** Perceived stress mediates the association between occupational stressors and mental health symptoms including anxiety (6a), depression (6b), and insomnia (6c).

## The Moderating Role of Social Support

While several studies have shown strong evidences for the (in)direct effect of occupational stressors on mental health symptoms via perceived stress, a few other studies have failed to find support for this pathway, suggesting these associations may be conditional on other factors.

The stress-buffering model of social support provides an important perspective in understanding the potential mechanism between the occupational stressors, perceived stress, and mental health symptoms. The stress-buffering hypothesis argues that the social support protects mental health through the indirect pathway of interacting with the stressors or moderating the effect (Cohen and Wills, 1985). In other words, social support may exert a direct effect by reducing the severity with which stressors are perceived, but it can also act as a buffer against the deleterious effects of stressors perception, reducing the activity of pathways that harm health (Cohen and Wills, 1985; Moseley et al., 2021). Based on this model, social support is a buffering factor in the development of psychopathology and adjustment difficulties following experiences of a stressful event(s) (Prahars et al., 2017). Empirical evidence of buffering effect of social support between stressors or stress and mental health problems has rapidly accumulated in recent years. For example, an

early and influential study found that the effect of negative daily events on psychological distress significantly decreased as positive social ties increased, which is in accordance with the stress-buffering hypothesis (Okun et al., 1990). Subsequent research has also supported the stress-buffering hypothesis of social support (Lakey and Cronin, 2008; Raffaelli et al., 2013).

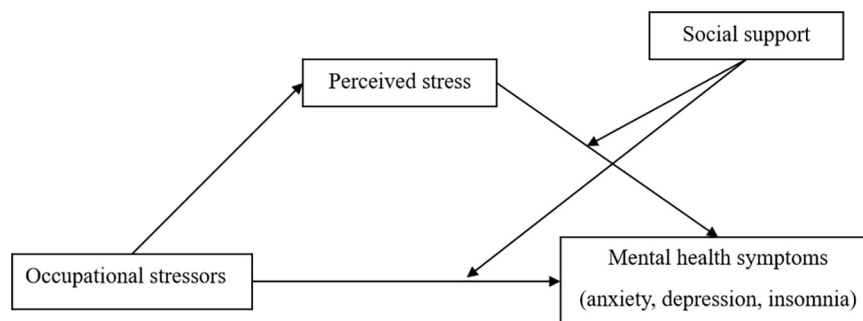
Prior finding suggested that social support is not only related to objective occupational stressors, but also related to individual perceived stress (Kneavel, 2021). Occupational stressors are work-related factors, which are objective factors that cause stress in one's job (Kshtriya et al., 2020), perceived stress is the psychological response to threatening stimuli in the environment after cognitive evaluation (Li and Lyu, 2020). It is crucial to distinguish the buffering effect of social support on occupational stressors and perceived stress. Although a large number of studies have demonstrated that social support moderated or buffered the relationship between stressful experiences and mental health, few studies have noted the role of social support as potential buffers of the stressors-stress-mental health symptoms relationship simultaneously, especially in frontline medical staff who mainly provide health care during the COVID-19 epidemic. Hence, in light of the theory of buffer theory of social support and previous research, this study examines social support as a critical moderator of the relationship between occupational stressors, perceived stress, and mental health symptoms.

**H<sub>3</sub>:** Social support moderates the association between occupational stressors, perceived stress, and mental health symptoms including anxiety (3a), depression (3b), and insomnia (3c).

## The Present Study

In this context, understanding the shifts in the frontline medical staff' mental health during the COVID-19 pandemic and the factors that may be influencing changes in mental health is relevant to comprehending frontline medical staff' responses to the ongoing pandemic. Furthermore, few studies have investigated the potential mechanism of occupational stressors and mental health symptoms of frontline medical staff during the COVID-19 pandemic. It is important to understand the effect of perceived stress and social support on this association to effectively prevent and treat psychological distress for frontline medical staff. This may provide some intervention measures to develop public health management in the future. Taken together, the aims of the present study are to (1) estimate the prevalence of and severity of three kinds of mental health symptoms including depression, anxiety, and insomnia among frontline medical staff, (2) identify the mediating role of perceived stress in the link between the occupational stressors and three kinds of mental health symptoms respectively, and (3) evaluate the moderating role of social support in the link among occupational stressors, perceived stress and three kinds of mental health symptoms. The full proposed model is displayed in **Figure 1**.





**FIGURE 1 |** The moderated mediation effect among occupational stressors, mental health symptoms (anxiety, depression, and insomnia), perceived stress, and social support.

## MATERIALS AND METHODS

### Participants and Procedure

Participants were frontline medical staff residing in Wenzhou, China who directly participated in the fight against COVID-19 by contacting confirmed COVID-19 cases or their specimens in the isolation hospitals (Zhang et al., 2020b). This study recruited participants through purposeful sampling via the website Wen Juan Xing,<sup>1</sup> a widely used online survey platform in China. According to the data on the 2020 coronavirus cases in China provided by the National Health Commission (NHC), the novel coronavirus outbreak (COVID-19) reached its peak between January 23, 2020 and February 4, 2020 and the number of new cases has steadily declined ever since. By January 29, 2020, 33,000 people had returned to Wenzhou from Wuhan and its neighboring cities, and 172 individuals were confirmed positive cases of COVID-19 in Wenzhou, making the city become the area with the most confirmed cases outside of Hubei Province in China. Lockdown was enacted in Wenzhou to curb the spread of COVID-19 virus on February 5, 2020.

The sample recruitment procedure consisted of a two-step procedure conducted in February 2020. First, a pilot study was conducted with the participation of 10 frontline medical staff from the target population to evaluate clarity, comprehensiveness, and acceptability of questionnaires. Second, in the formal study, links to the survey were sent to frontline medical staff via WeChat (the most widely used social media platform in China). Participants completed and submitted the questionnaire on their smartphones by clicking the survey link. The questionnaires were responded anonymously and voluntarily. An online consent form was provided to the participants before filling out the questionnaire. The survey would not continue unless participants chose the option – “Yes, I consent to take part in this survey.” Hence, a total of 525 frontline medical staff residing in Wenzhou participated. Of the 525 participants, 392 (74.7%) were female, ages ranged from 19 to 60 years-old ( $M = 35.29$ ,  $SD = 7.05$  years), 442 (84.2%) at college or higher education levels, and 416 (79.2%) were reported being married. The length of professional medical

service ranged from 0 (<1 year) to 44 years ( $M = 12.32$ ,  $SD = 8.66$  years). Details of socio-demographic characteristics of the participants are displayed in **Table 1**. The study was approved by the Ethics Committee of Wenzhou Medical University, and all methods of this study were carried out in accordance with the approved guidelines.

### Measurements

#### Socio-Demographic Data

These data include sex, age, education level, marital status, and length of service.

#### Perceived Stress

The 10-item Perceived Stress Scale (PSS-10) (Leung et al., 2010) was utilized to evaluate perceived stress in clinical settings. Participants responded to each question on a 5-point Likert scale ranging from 0 (never) to 4 (very often), indicating how often they have felt or thought a certain way within the past month. Higher score means of greater perceived stress. Previous studies have shown that the Chinese version of the PSS-10 has good reliability and validity (Wang et al., 2011), and it has demonstrated excellent internal consistency ( $\alpha = 0.91$ ) in the present study.

**TABLE 1 |** Socio-demographic of the frontline medical staff ( $N = 525$ ).

Variables		N	%
Sex	Male	133	25.3%
	Female	392	74.7%
Age: years old	≤30	149	28.4%
	31–50	366	69.7%
	> 50	10	1.9%
Education level	High school or below	83	15.8%
	College or above	442	84.2%
Marital status	Married	416	79.2%
	Unmarried	109	20.8%
Length of service: years	≤10	263	50.1%
	10–20	175	33.3%
	>20	87	16.6%

<sup>1</sup> www.wjx.cn

## Social Support

Five items assessing participants' perceptions of support from (1) family, (2) friends, (3) supervisors, (4) colleagues, and (5) Mental health worker during the COVID-19 epidemic were used as indicators of social support. Responses were recorded on a 4-point scale ranging from "not at all" to "extremely strong." Example items include "I get help and support I need from my family" and "I get help and support I need from my friend." A higher mean score indicates stronger social support. The items demonstrated good internal consistency in this sample ( $\alpha = 0.86$ ).

## Occupational Stressors

The self-designed questions were used to measure the occupational stressors of frontline medical staff during the COVID-19 outbreak. It consists of three items: (1) work difficulty, (2) work stress, and (3) work risk during the COVID-19 pandemic. Example items include "My work was very difficult during the epidemic" and "My work was at great risk during the epidemic." Participants were asked to score each item on a 5-point scale, from 1 (Strongly Disagree) to 5 (Strongly Agree). The higher the score is, the more occupational stressors. In this study, the items had acceptable internal reliability ( $\alpha = 0.77$ ).

## Self-Reported Symptoms of Mental Health

### Anxiety

The Generalized Anxiety Disorder Scale-7 item (GAD-7) (Spitzer et al., 2006) was used. Each of the items on the GAD-7 is rated on a 4-point scale from 0 (not at all) to 3 (almost every day). The GAD-7 has been found to be a well-validated screening instrument (Abe et al., 2020); in this study, it had excellent internal consistency ( $\alpha = 0.94$ ).

### Depression

The level of depression in participants was assessed using the Patient Health Questionnaire-9 item (PHQ-9) (Kroenke et al., 2001). A 4-point Likert scale is used (0, not at all; 3 almost every day). Participants responded to the increase in the frequency of experiencing difficulties in each area over the past 2 weeks. Previous work has demonstrated good psychometric characteristics (Abe et al., 2020); in the present study, the internal consistency was acceptable ( $\alpha = 0.74$ ).

### Insomnia

The Insomnia Severity Index (ISI) (Smith and Trinder, 2001) was used. Participants responded on a 5-point scale ranging from 1 (not at all) to 5 (almost every day). Higher scores indicate greater severity of insomnia. Previous studies using the ISI supported its psychometric properties (Yu, 2010), and it has showed good internal consistency ( $\alpha = 0.94$ ) in this study.

## Statistical Analysis

The data for this study were based on self-reports from frontline medical staff, it was possible that there could be an issue with common method variance. We used Harman's one-factor test to detect the presence of common method bias (Podsakoff et al., 2003). Results showed that there were nine factors with the eigenvalue greater than 1, and the first factor to explain the

variance accounted for 27.48%, which was less than the critical value of 40%, indicating that the common method deviation was not obvious.

First, mean, standard deviation, and frequency of the socio-demographic characteristics of the sample were examined. We calculated prevalence estimates and frequency of the mental health symptoms among frontline medical staff during the COVID-19 epidemic. Second, for the main analysis, the descriptive information and correlation matrix were conducted. Third, after all the data were standardized, based on 5,000 bootstrap samples, the PROCESS macro (Hayes, 2013) was used to test the mediating effect of perceived stress between occupational stressors and three mental health symptoms respectively (model 4). Based on the established mediation model, we further tested the moderating role of social support between the association of occupational stressors, perceived stress, and three mental health symptoms respectively (model 15). The control variables were sex, age, education level, marital status, and length of service. The effects are significant when the confidence intervals exclude zero.

## RESULTS

### Prevalence and Characteristics of Mental Health Symptoms

**Table 2** shows the prevalence of three types of mental health problems in frontline medical staff during the COVID-19 epidemic. Overall, out of 525 frontline medical staff, 209 (39.8%) subjects had symptoms of anxiety and 50 (9.5%) had moderate and above moderate level of anxiety on the GAD-7; 157 (29.9%) subjects had symptoms of depression and 28 (5.3%) had moderate and above moderate level of depression on the PHQ-9; 199 (37.9%) subjects had symptoms of insomnia and 46 (8.8%) had moderate and above moderate level of insomnia on the ISI.

### Preliminary Analyses

Confirmatory factor analyses were performed to discern whether the anxiety, depression, and insomnia represented the symptoms of mental health had a good fit. A three-factor model,  $\chi^2 = 1013.07$ ,  $df = 227$ ,  $p < 0.001$ , comparative fit index (CFI) = 0.90, and root mean square error of approximation (RMSEA) = 0.08, in which anxiety and depression and insomnia were distinct constructs, fit the data better than a one-factor model ( $\chi^2 = 3243.17$ ,  $df = 230$ ,  $p < 0.001$ , CFI = 0.63, and RMSEA = 0.16). The result of these confirmatory factor analyses indicated the appropriateness of treating anxiety, depression, and insomnia as empirically distinct constructs.

Descriptive statistics and correlations for some variables measured are reported in **Table 3**. As expected, occupational stressors and perceived stress were positively associated with three types of mental health symptoms respectively ( $ps < 0.05$ ). Social support was significantly and inversely correlated with anxiety, depression, and insomnia respectively ( $ps < 0.001$ ). Social support was negatively associated with perceived stress ( $p < 0.001$ ), but not with occupational stressors. In addition, in demographic variables, age was positively associated with

**TABLE 2 |** The prevalence of mental health symptoms in frontline medical staff.

Mental health symptoms	participants (n = 525)
Anxiety	
No anxiety	316 (60.2%)
Mild anxiety	159 (30.3%)
Moderate anxiety	33 (6.3%)
Severe anxiety	17 (3.2%)
Depression	
No depression	368 (70.1%)
Mild depression	129 (24.6%)
Moderate depression	22 (4.2%)
Moderately severe or severe depression	6 (1.1%)
Insomnia	
Absence of insomnia	326 (62.1%)
Mild insomnia	153 (29.1%)
Moderate insomnia	40 (7.6%)
Severe insomnia	6 (1.1%)

Data are n (%); percentages represent the distribution of variable categories among all participants.

occupational stressors and anxiety respectively ( $p_s < 0.05$ ); length of service was positively associated with occupational stressors and anxiety respectively ( $p_s < 0.05$ ); education level was positively associated with occupational stressors and depression respectively ( $p_s < 0.05$ ); marital status was significantly and inversely correlated with occupational stressors and anxiety respectively ( $p_s < 0.05$ ); and sex identification did not significantly correlate with any of the variables ( $p_s > 0.05$ ), as such it was excluded from the remaining analysis.

## Main Effects Results

The variable occupational stressors were significantly associated with mental health symptoms respectively (anxiety:  $\beta = 0.73$ ,  $t = 6.87$ ,  $p < 0.001$ ,  $\Delta R^2 = 0.08$ ; depression:  $\beta = 0.55$ ,  $t = 5.77$ ,  $p < 0.001$ ,  $\Delta R^2 = 0.06$ ; and insomnia:  $\beta = 0.29$ ,  $t = 1.99$ ,  $p < 0.05$ ,  $\Delta R^2 = 0.0037$ ), providing support for Hypothesis 1 a/b/c. Occupational stressors were also significantly positively associated with perceived stress ( $\beta = 0.37$ ,  $t = 2.76$ ,  $p < 0.01$ ,  $\Delta R^2 = 0.014$ ). Perceived stress was significantly associated with mental health symptoms (anxiety:  $\beta = 0.39$ ,  $t = 12.28$ ,  $p < 0.001$ ,  $\Delta R^2 = 0.22$ ; depression:  $\beta = 0.38$ ,  $t = 13.85$ ,  $p < 0.001$ ,  $\Delta R^2 = 0.22$ ; and insomnia:  $\beta = 0.38$ ,  $t = 8.71$ ,  $p < 0.001$ ,  $\Delta R^2 = 0.12$ ).

## The Mediating Effects of Perceived Stress

The PROCESS macro (model 4) (Hayes, 2013) was used to test the mediating effect of perceived stress between occupational stressors and mental health symptoms, respectively. Significance of indirect effect was determined via 5,000 bias-corrected bootstrap confidence intervals using 1,000 bootstrap samples and 95% confidence intervals. The 95% confidence intervals that do not contain zero indicate effects that are significant.

In the model of anxiety, as shown in **Figure 2A**, occupational stressors were significantly associated with anxiety indirectly through perceived stress [Effect = 0.13, SE = 0.05, 95% CI (0.04,

0.25)]. The direct effect of occupational stressors on anxiety was also significant [Effect = 0.59, SE = 0.09, 95% CI (0.41, 0.78)], confirming perceived stress as a partial mediator of the link between occupational stressors and anxiety.

In the model of depression, as shown in **Figure 2B**, occupational stressors were significantly associated with depression indirectly [Effect = 0.13, SE = 0.05, 95% CI (0.03, 0.25)], the direct effect of occupational stressors on depression was also significant [Effect = 0.41, SE = 0.08, 95% CI (0.25, 0.58)]. Perceived stress was again a partial mediator of the link between occupational stressors and depression.

In the model of insomnia, as shown in **Figure 2C**, the indirect association between occupational stressors and insomnia was significant [Effect = 0.14, SE = 0.06, 95% CI (0.04, 0.26)], but the direct effect of occupational stressors on insomnia was not significant [Effect = 0.15, SE = 0.14, 95% CI (−0.12, 0.42)]. These findings confirmed that perceived stress was a full mediator of the link between occupational stressors and insomnia.

In sum, the results supported Hypothesis 2. Specifically, perceived stress was a partial mediator of the link between occupational stressors and anxiety, depression symptoms, and was a full mediator of the link between occupational stressors and insomnia symptoms.

## The Moderating Effects of Social Support

Hypothesis 3 proposes that participants' social support moderates the relationship between occupational stressors, perceived stress, and three mental health symptoms. Model 15 of Hayes's (2013) PROCESS macro using 5,000 bias-corrected bootstrapped samples was used to test this relationship.

### Anxiety

In the model of anxiety, as shown in **Table 4**, the interaction between occupational stressors and social support on anxiety was not significant ( $\beta = -0.02$ ,  $t = -0.72$ ,  $p = 0.47$ ,  $\Delta R^2 = 0.0007$ ), but the interaction between perceived stress and social support on anxiety was significant ( $\beta = -0.01$ ,  $t = -2.08$ ,  $p = 0.04$ ,  $\Delta R^2 = 0.01$ ) after accounting for the mediating role of perceived stress. Thus, social support moderates the indirect effect of occupational stressors on anxiety via perceived stress but does not moderate the direct effect of occupational stressors on anxiety.

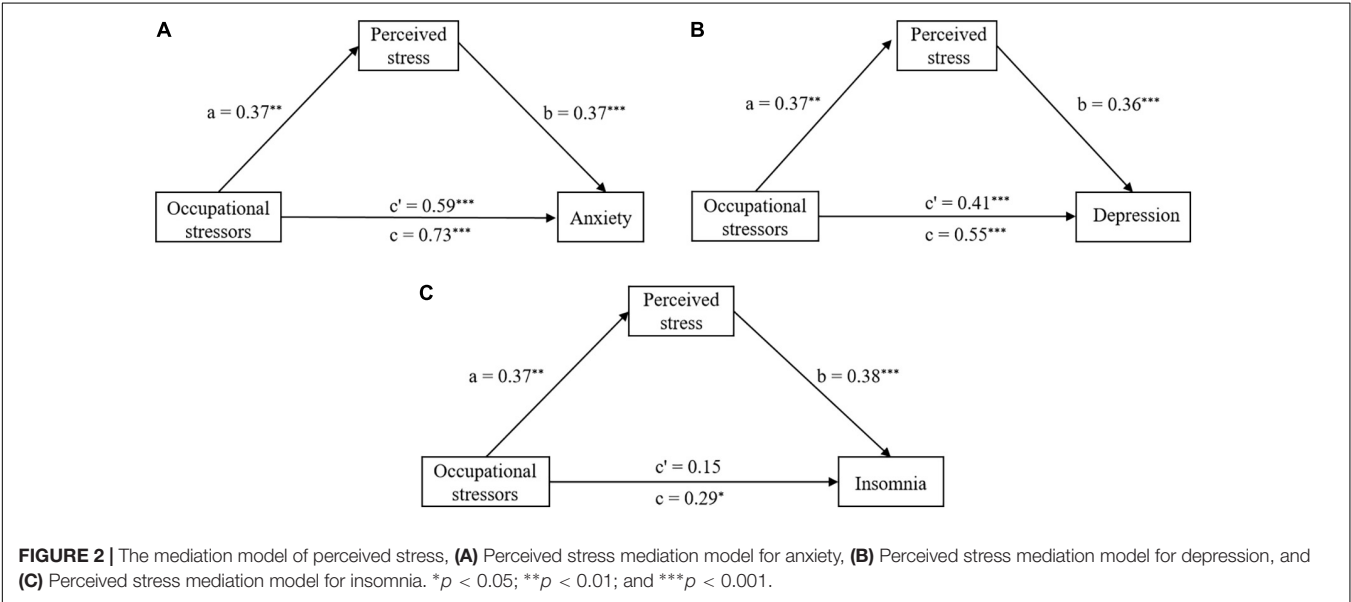
To clarify the direction of the interaction, the variable anxiety was plotted on perceived stress, separately at high (1 SD above the mean) and low (1 SD below the mean) levels of social support. **Figure 3** shows that low social support was associated with high level of anxiety for those with high level of perceived stress. However, for those with high social support, the level of anxiety was relatively low even when the level of perceived stress was notably high.

Furthermore, simple slope tests showed that participants with low level of social support (1 SD below the mean) and higher perceived stress combined were associated with more anxiety symptom ( $slope = 0.40$ , SE = 0.04,  $p < 0.001$ ). For participants with a high level of social support, the effect of perceived stress on anxiety symptom was also significant ( $slope = 0.28$ , SE = 0.05,  $p < 0.001$ ) but not as strong as that for participants with low social support.

**TABLE 3 |** Means, standard deviations, and correlations among study variables.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Age	35.29	7.05	1							
2. Length of service	12.32	8.66	0.83***	1						
3. Occupational stressors	11.04	1.65	0.11*	0.11*	1					
4. Perceived stress	23.79	5.04	-0.06	-0.05	0.12**	1				
5. Social support	19.11	4.33	-0.003	0.008	0.02	-0.27***	1			
6. Anxiety	4.30	4.17	0.13**	0.11*	0.30***	0.46***	-0.18***	1		
7. Depression	3.36	3.67	-0.04	-0.06	0.24***	0.52***	-0.26***	0.71***	1	
8. Insomnia	6.47	5.47	-0.03	-0.08	0.09*	0.36***	-0.22***	0.47***	0.58***	1

Covariate: sex, age, education level, marital status, and length of service. \**p* < 0.05; \*\**p* < 0.01; and \*\*\**p* < 0.001.



**TABLE 4 |** Testing the moderated mediation effect in the model of anxiety.

	Model a (Anxiety)		Model b (Anxiety)		Model c (Anxiety)	
	<i>b</i>	<i>T</i>	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>
Occupational stressors	0.77	7.34***	0.62	6.48***	0.61	6.33***
Social support	-0.18	-4.55***	-0.07	-1.81	-0.06	-1.70
Occupational stressors × Social support	-0.05	-2.01*	-0.03	-1.28	-0.02	-0.72
Perceived stress			0.35	10.84***	0.34	10.59***
Perceived stress × Social support					-0.01	-2.08*
<i>R</i> <sup>2</sup>	0.38		0.55		0.56	
<i>F</i>	12.77***		28.40***		25.88***	

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

Moreover, the bootstrap procedure confirmed that the indirect effect of occupational stressors on anxiety symptom through perceived stress was moderated by social support, because the index of moderated mediation was significant [ $\beta = -0.01$ ,  $SE = 0.003$ , 95%  $CI = (-0.01, -0.0002)$ ]. The indirect effect of perceived stress for participant with low social support [ $\beta = 0.15$ ,  $SE = 0.06$ , 95%  $CI = (0.04, 0.27)$ ] was stronger than those with high social support [ $\beta = 0.10$ ,  $SE = 0.04$ , 95%  $CI = (0.02, 0.20)$ ]. Therefore, our hypothesis 3a was supported.

### Depression

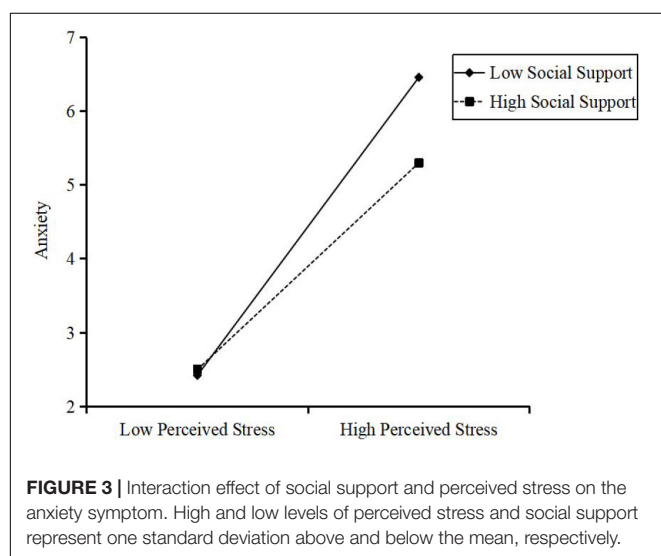
In the model of depression, as shown in **Table 5**, the interaction between occupational stressors and social support on depression was not significant ( $\beta = -0.03$ ,  $t = -1.30$ ,  $p = 0.19$ ,  $\Delta R^2 = 0.002$ ), but the interaction between perceived stress and social support on depression was significant ( $\beta = -0.03$ ,  $t = -4.28$ ,  $p < 0.001$ ,  $\Delta R^2 = 0.02$ ) after accounting for the mediating role of perceived stress. This indicates that social support can moderate the indirect effect of occupational stressors on depression via perceived



**TABLE 5 |** Testing the moderated mediation effect in the model of depression.

	Model a (Depression)		Model b (Depression)		Model c (Depression)	
	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>
Occupational stressors	0.60	6.59***	0.46	5.65***	0.44	5.40***
Social support	−0.23	−6.73***	−0.13	−3.96***	−0.12	−3.79***
Occupational stressors × Social support	−0.07	−3.06**	−0.05	−2.41**	−0.03	−1.30
Perceived stress			0.33	11.90***	0.31	11.56***
Perceived stress × Social support					−0.02	−4.28***
<i>R</i> <sup>2</sup>	0.40		0.58		0.60	
<i>F</i>	13.70***		32.96***		32.31***	

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



stress, but cannot moderate the direct effect of occupational stressors on depression.

To clarify the direction of the interaction, participants' depression symptom was plotted on perceived stress, separately at high (1 SD above the mean) and low (1 SD below the mean) levels of social support. **Figure 4** shows that low social support was associated with high level of depression for those with high level of perceived stress. However, for those with high social support, the level of depression was relatively low even with the high level of perceived stress.

Further, simple slope tests showed that low level of social support (1 SD below the mean), and higher perceived stress combined was associated with more depression symptom (*slope* = 0.42, *SE* = 0.04, *p* < 0.001). For participants with a high level of social support, the effect of perceived stress on depression symptom was also significant (*slope* = 0.21, *SE* = 0.04, *p* < 0.001) but not as strong as that for participants with low social support.

Moreover, the bootstrap procedure confirmed that the indirect effect of occupational stressors on depression symptom through perceived stress was moderated by social support, because the index of moderated mediation was significant [ $\beta$  = −0.01, *SE* = 0.004, 95% *CI* = (−0.02, −0.002)]. The indirect effect of

perceived stress for participant with low social support [ $\beta$  = 0.16, *SE* = 0.06, 95% *CI* = (0.04, 0.28)] was stronger than those with high social support [ $\beta$  = 0.08, *SE* = 0.03, 95% *CI* = (0.02, 0.15)]. Therefore, our hypothesis 3b was supported.

### Insomnia

In the model of insomnia, as shown in **Table 6**, the interaction between occupational stressors and social support on insomnia was not significant ( $\beta$  = −0.03, *t* = −0.80, *p* = 0.42,  $\Delta R^2$  = 0.001), and the interaction between perceived stress and social support on insomnia was also not significant ( $\beta$  = −0.02, *t* = −1.85, *p* = 0.07,  $\Delta R^2$  = 0.006). Thus, Hypothesis 3c was not supported.

In sum, Hypothesis 3 was partially supported. Specifically, social support could moderate the indirect effect of occupational stressors on anxiety and depression, but not insomnia; social support cannot moderate the direct effect of occupational stressors on three mental health symptoms (anxiety, depression, and insomnia).

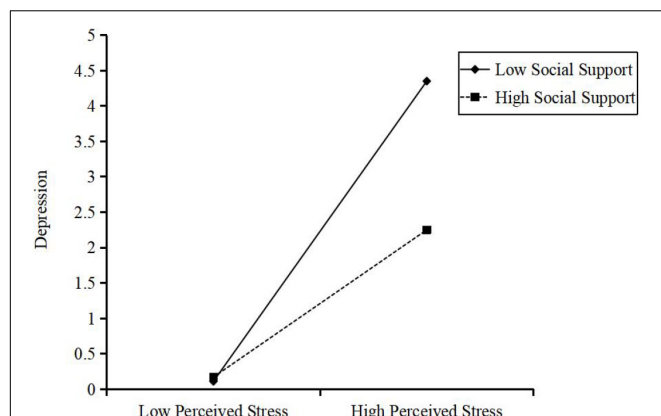
## DISCUSSION

As an international public health emergency, COVID-19's impact on mental health has gained widespread attention from the public. This study estimated the prevalence and severity of three mental health symptoms among frontline medical staff. It also evaluated the mediating role of perceived stress in the link between the occupational stressors and three mental health symptoms separately. Finally, it examined the moderating role of social support in the link among occupational stressors, perceived stress, and three mental health symptoms respectively.

### Prevalence and Characteristics of Mental Health Symptoms

The first finding of the study is that the prevalence of anxiety, depression and insomnia symptom among frontline medical staff were respectively 39.8, 29.9, and 37.9%. Although these incidence rates are within the estimated range of mental health symptom reported in the global studies of frontline medical staff (Luo et al., 2020; Sanghera et al., 2020), it is also noted that this result is inconsistent with findings of other studies (Lai et al., 2020; Tan et al., 2020). For instance, Tan et al. (2020) surveyed 470 health care workers in Singapore during the COVID-19





**FIGURE 4 |** Interaction effect of social support and perceived stress on the depression symptom. High and low levels of perceived stress and social support represent one standard deviation above and below the mean, respectively.

epidemic and found that the prevalence of anxiety, depression symptoms were 14.5 and 8.9%, respectively, which is much lower than the rate in this study. Another study reported that more than 70% of the respondents among 1,257 frontline health care workers experienced psychological distress, which is higher than the rate in this study (Lai et al., 2020). This difference could be related to various assessment scales used, different samples selected, and the different data analyses performed in these studies. In addition, the prevalence of mental health symptoms among general population in China was approximately 7.2–18.3% during the COVID-19 outbreak (Liang et al., 2020). Higher risk of infection and more occupational stressors may be the main reasons for the poorer mental health of frontline medical staff. The present study indicates that the substantial psychological impact of the pandemic on frontline medical staff, resulting in a range of mental health symptoms including anxiety, depression, and sleep disturbances. Thus, more attention should be paid to health professionals in future studies.

## Occupational Stressors and Three Mental Health Symptoms

The second finding of the study is that occupational stressors were positively associated with three mental health symptoms including anxiety, depression, and insomnia. These findings are in line with the first hypothesis and consistent with recent studies regarding the relationship between occupational stressors and mental distress (Sauerbrei and Pham, 1986; Pappa et al., 2020; Abbas et al., 2021). Extra workload can lead medical staff to work harder to combat the pandemic and it can also increase their risks for various mental health-related issues including anxiety, fear, depression, and discrimination (Abbas et al., 2021). This study highlights the importance of providing support for frontline medical staff to manage their occupational stressors in order to alleviate their mental health problems (Mo et al., 2020). It expands this view by comparing the effect of occupational stressors on anxiety, depression, and insomnia. Still, in contrast

to anxiety (73%) and depression (55%), occupational stressors were found to account for only 29% of symptoms of insomnia. During the COVID-19 peak outbreak, stressful occupational circumstances may serve as an acute stressor, which can trigger more negative emotional symptoms than somatic symptoms. Under this situation, emotional acceptance-centric mindfulness-related techniques may be an essential learning tool for medical staff to help them manage occupational stressors in crisis-related situations alike a pandemic.

## The Mediating Effects of Perceived Stress

The third finding of the study is that perceived stress was a strong statistical mediator of the relationship between occupational stressors and three mental health symptoms among frontline medical staff. It supports the second hypothesis and is consistent with results of previous stress studies (Harvey et al., 2010). This mechanism sheds light on why occupational stressors can lead to negative health outcomes.

Importantly, we found that perceived stress was a partial mediator of the link between occupational stressors and anxiety and depression among frontline medical staff. The cognitive appraisal theory shows that psychological distress is not solely the results of stressful events, but is also determined, to a large extent, by individual cognitive evaluation (Balieiro et al., 2011). The mediating roles of cognitive appraisal on the links from occupational stressors to mental health problems among nurses were confirmed in a previous study (Zhang et al., 2021a). It is noted that perceived stress may be due to limited resources available for frontline medical staff during the COVID-19 pandemic. Such resources may be essential in high-intensity work (Man et al., 2020). Still, some medical staff will perceive more stress beyond the work itself. The high perceived stress can indeed lead to the high feeling of negative emotions (i.e., anxiety and depression) among frontline medical staff (Wang and Wang, 2019; Abbas et al., 2021).

Furthermore, perceived stress was a full mediator and not a partial mediator of the link between occupational stressors and insomnia among frontline medical staff. This result indicated that the direct effect of occupational stressors on insomnia is weak, and the occupational stressors influences the insomnia mostly through the mediation role of perceived stress. Thus, to the extent possible, sustainable strategies may be developed and implemented to reduce perceived stress among frontline medical staff. A recent randomized controlled trial (RCT) found that a mindfulness-based stress reduction program was effective in reducing perceived stress among breast cancer survivors in China (Zhang et al., 2017). Future interventions and applied research may consider training medical staff to better understand and manage stress in order to alleviate the sleep impact of occupational stressors in crisis-related circumstances (Zhang et al., 2021a).

## The Moderating Effect of Social Support

The fourth finding of the study is that social support did not moderate the direct effects of occupational stressors and three

**TABLE 6 |** Testing the moderated mediation effect in the model of insomnia.

	Model a (Insomnia)		Model b (Insomnia)		Model c (Insomnia)	
	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>
Occupational stressors	0.35	2.42*	0.20	1.47	0.18	1.33
Social support	−0.28	−5.21***	−0.17	−3.22**	−0.17	−3.13**
Occupational stressors × Social support	−0.06	−1.85	−0.04	−1.30	−0.03	−0.80
Perceived stress			0.33	7.27	0.32	7.05***
Perceived stress × Social support					−0.02	−1.85
<i>R</i> <sup>2</sup>	0.29		0.41		0.42	
<i>F</i>	6.81***		13.17***		12.14***	

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

mental health symptoms, but moderate the indirect effects of occupational stressors on anxiety and depression (not insomnia) via perceived stress. The results revealed that higher perceived stress was associated with more anxious and depressive emotional reactions in individuals with low social support. This is consistent with the buffer theory of social support, stating that low social support may be one of the main reasons why individuals suffering from the heavy and acute occupational stressors tend to experience negative emotions such as anxiety and depression (Huang et al., 2020; Zhang et al., 2020a).

Moreover, this study extends this view in three ways. First, social support can provide a buffer for individuals' negative emotional reactions when dealing with occupational stressors. This buffer is legitimately not evident for medical staff somatic symptoms such as insomnia: COVID-19 leads to realistically enormous physical constraints including intermittent or irregular sleep hygiene in medical staff and these can limitedly be alleviated through social support. In addition, even without the pandemic, the prevalence of sleep disturbances among medical staff is still higher than general population (Zhang et al., 2021a). Thus, we should explore other factors that affect sleep to help reduce the sleep difficulty of medical staff. Secondly, this study found that social support only moderated the path between perceived stress and anxiety and depression. One possible explanation is that social support may intervene between a threatening event and a stress response by attenuating the stress appraisal (Baqtayan, 2011; Rollock and Lui, 2016). Frontline medical staff with higher levels of social support may be more likely to believe that others would provide the necessary resources to solve the problem when they encounter stress. This may help them redefine the perception about the potential harm of a situation and prevent a situation from being appraised as highly stressful (Zhou et al., 2019). Thirdly, another interesting finding is that social support did not moderate the direct effects of occupational stressors and three mental health symptoms. The buffer theory of social support reveal that the positive impact of social support in reducing psychological distress only occurs with perceived stress or distress (Cohen and Wills, 1985; Wang et al., 2020). For instance, a study found that for breast cancer patients, the most painful groups benefited the most from social support, but those with less distress did not get much additional benefit from social support (Mallinckrodt et al., 2012). Occupational stressors are valid concerns about work intensity, work difficulty, etc. The

specialized knowledge and advanced skill of medical staff had crucial roles in treating patients with COVID-19. In addition, frontline medical staff showed a great sense of conscientiousness and the spirit of self-sacrifice during the COVID-19 epidemic. Liu et al. (2020) shared that Chinese health care providers reported stronger identification to their professional duty since COVID-19. Previous studies have also shown that medical staff with high levels of professional identity might perceive their occupation positively, which may improve their ability to resist stress, thereby reducing their perception of stress (Zhang et al., 2021b). When occupational stressors are not perceived as threatening to one sense of self, the stress response may not be activated. Thus, the result suggests that social support under perceived stress is more effective for helping individuals alleviate mental health problems.

## LIMITATIONS AND IMPLICATIONS

Several limitations in this study should be mentioned. First, the respondents were all from Wenzhou, Zhejiang Province, which is one of the worst COVID-19 affected cities in China except Hubei Province. Certainly, the findings pertain may not generalize to frontline medical staff in other regions of China. Second, our study was based on cross-sectional design and causal inferences was limited. Future studies may adopt a longitudinal research design to provide evidence for the causal assumptions reported in this study. Thirdly, this study did not explore the potential relationship between demographic variables (such as age, marriage, culture, etc.) and mental health symptoms. In the future research, we will focus on it. Finally, we used a self-designed questionnaire to measure occupational stressors, and the results of the study relied on self-reported data, which may be subjective to some extent. Future research should choose standardized questionnaires whenever possible and collect data from multiple informants (e.g., family, co-workers, and supervisors) or multiple methods (e.g., objective and subjective measures).

Despite the aforementioned limitations, our study has meaningful implications in medical practice. First, based on the findings of high prevalence of anxiety, depression, and insomnia among frontline medical staff during the COVID-19 epidemic, the Chinese hospital managers may attend more to the growing concern of mental health among medical staff by increasing

mental health awareness training, establishing mental health risk assessment, and empowering efficient coping interventions. Second, there is a significant association between occupational stressors and mental health symptoms among the frontline medical staff. Continuing medical education and targeted training in biological disaster ability can reduce occupational stressors, and thus improve the mental health of the medical staff. Organizational training on adequate work-related climate to navigate crisis interventions may also accentuate structurally-driven occupational stressors. Third, perceived stress is an important mechanism by which the occupational stressors of unexpected public crisis affect mental health among frontline medical staff. At the organizational level, the provision of adequate facilities, supportive health climate, inclusive work culture, along with wellbeing incentives, and can help medical staff to reduce their perceived stress (Abbas et al., 2021). At the medical staff level, in addition to strengthening psychological resilience, appropriate coping styles that center on realistic and accurate interpretation of stressful circumstances should be attained to correctly handle stressful events. Furthermore, some COVID-19 medical staff with severe sleep disorders should encourage them to seek help from sleep specialists or receive prescribed medical treatment. Finally, social support is another essential component of the mental health of the frontline medical staff. A multifaceted social support program based on the Chinese cultural values may be developed to promote mental health among the medical staff (Zhang et al., 2020a). In the workplace, harmonious interpersonal relationship with colleagues and supervisors should be encouraged. The services and sacrifices of medical staff should also be recognized and appreciated by the civil society and the media.

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## 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.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of the Wenzhou Medical University. 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

DB, LC, YLi, YZ, YLu, and FZ participated in research design. DB, LC, XL, AN-A, KX, LH, HW, and ZC collected the data. DB, LC, YLi, YZ, YLu, and GS conducted the data analysis. DB, LC, YLi, YZ, YLu, FZ, XL, and AN-A wrote and contributed to the writing of the manuscript. All authors have read and agreed to the published version of the manuscript.

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# Research of the Changes in the Psychological Status of Chinese University Students and the Influencing Factors During the COVID-19 Pandemic

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**Background:** Psychological dynamics of college students have changed during the COVID-19 outbreak but little research has been done in this area. The purpose of this study is to investigate the dynamic changes in the mental health status of college students since the outbreak of the COVID-19 pandemic 1 year and the influencing factors.

**Methods:** The research period was from February 2020 to August 2021. 384 college students were analyzed three times during this period on the recognition and psychological state of the pandemic.

**Results:** During the period from February 2020 to August 2021, in general, the positive scores rose from 20.79 to 23.46, while the negative scores dropped from 17.41 to 14.00. The regression analysis results on the influencing factors showed the degree of recognition of the pandemic is all significant in the three phases ( $p < 0.05$ ).

**Conclusion:** With the effective control of the pandemic, the mental state of the students showed a slight improvement in the environment of sporadic cases. Behavior has a partial mediating effect between the source of fear and psychological changes. Correct behavior guidance can effectively reduce the psychological changes caused by college students' fear.

**Keywords:** COVID-19, psychological state, influencing factors, college students, questionnaire survey

## INTRODUCTION

The sudden attack of the COVID-19 pandemic has drastic negative effects on every segment of human society in the socio-psychological and physical paradigm. The sustainable development goals in all aspects of the global economy, agriculture, environment and education were materially affected (Wang and Huang, 2021). In February 2020, governments of various countries implemented various measures such as city blockade, travel warning regulations, and home medical

observation to prevent and control the spread of the virus. Especially in China, until 2021, the lockdown policy is still implemented in areas with more cases. These policies restricted people's travel and changed their lifestyles. The implementation had a serious impact on the mental state of people around the world.

In March 2022, the World Health Organization (WHO) said that the global prevalence of anxiety and depression increased by 25% in the first year of the COVID-19 epidemic. Among them, according to the CDC's COVID-19 Data from NCHS—Mental Health: Household Pulse Survey, the COVID-19 pandemic has increased the prevalence of mental illness, including depression, anxiety, and suicide rates in the United States (Centers for Disease Control and Prevention, 2020). Similarly, a survey of 2,400 Japanese people by Kikuchi et al. (2020) showed that the mental health of Japanese people deteriorated from the early stage of COVID-19 to the stage of community transmission. China is currently one of the countries with the strictest implementation of various measures, such as city blockade, travel warning regulations and home medical observation, also one of the countries with the best epidemic control. A large sample survey conducted by Chinese scholars across the country showed that 35% of the public experienced psychological distress during the outbreak of COVID-19 (Qiu et al., 2020). And studies have reported various psychological problems, such as anxiety, fear, depression, and insomnia in the public during the epidemic (Li W. et al., 2020). The negative effects that the pandemics incurred are drastic.

Mental health is an important part of physical and mental health, and it is also an indispensable important content in college students' study, growth and life. The state of college students' mental health directly determines the outcome of college education and the development prospects of the students themselves (GS, 2019). Although the cure rate of COVID-19 has been greatly increased, the public is prone to anxiety and panic due to its extremely contagious nature, susceptibility to mutation and lack of rapid treatment methods. The comprehensive awareness of COVID-19 is generally low among college students (Agorastos et al., 2021). Thus, they are more prone to psychological problems. In a COVID-19 study on youth conducted, 12.8% of participants were diagnosed with PTSD, which shows the significance of public health emergencies on the youth population (Liang et al., 2020). Meanwhile, the United States CDC found that mood and anxiety disorders tripled in 2020 compared with 2019, especially among 18–29-year-olds (Centers for Disease Control and Prevention, 2020). Moreover, a study by Chinese scholars showed that among 3,881 ordinary Chinese college students, the incidence of anxiety disorders was 26.60% (Chang et al., 2020). Sun et al. (2021) found that 1,921 Chinese college students facing quarantine reported more common psychiatric symptoms.

In this context, this work is devoted to exploring the changes and influencing factors of the psychological state of Chinese college students since the COVID-19 pandemic began one and a half years ago. Since college students are considered to be the workhorses of the future society, their mental state during the pandemic should also be taken seriously. This is significant for

major Chinese universities to take correct intervention measures for the problems of college students' psychological state, even for universities in countries other than China.

## LITERATURE REVIEW

In terms of the overall psychology of Chinese citizens affected by the pandemic, domestic scholars have paid more attention to the personal factors related to the difference in the degree of the pandemic affecting mental health including age, gender, place of residence, whether they are close contacts and physical health (Hossain et al., 2020). Studies have shown that women and students, whether have symptoms of the COVID-19, pandemic-related news, social media connections, psychosocial support, and trust in the government may all affect the public's mental state (Huang et al., 2020; Yaner, 2020). Among them, the public's trust in the government can significantly alleviate the public's psychological crisis (Yaner, 2020), and good social support can also alleviate public anxiety and depression, making them more positive and optimistic in responding to public emergencies (Lei and Fei, 2020). In addition, during the COVID-19 pandemic, the public's environment will affect their psychological state. Studies have shown that with the increase in the cumulative number of confirmed local cases and the severity of the epidemic, the public's psychology tends to be tense and negative (Fang and Bing, 2020; Xu and Tingting, 2020; Haijuan and Ziming, 2021). Regarding college students, the related factors affecting the mental health of college students include only-child status, marital status, family economic status, physical and mental health status (Haijuan and Ziming, 2021). Among them, the anxiety and depression of the undergraduate group are more serious than the postgraduate group; the only child is more serious than the non-only child; the college students with difficult family financial status and poor physical are more serious. There are also studies showing that seniors experience more anxiety than freshmen (Li et al., 2021). Besides, worldwide phenomena have established risk factors for the mental health and well-being of youth over the past 15 years, such as the economic crisis, climate change and the COVID-19 pandemic (Poletti et al., 2022). The burden of their cumulative impact on mental health may be more severe, especially in the impact of psychopathological manifestations. Furthermore, the outbreak of COVID-19 will affect the development of the environment and economy. The outbreak of COVID-19 has improved air quality in China in the short term. However, in the long run, air quality may deteriorate beyond pre-event levels when China fully lifts its lockdown and resumes large-scale industrial production (Wang and Su, 2020). The COVID-19 pandemic has triggered economic and energy crises, and China will play an important role in the post-pandemic global economic recovery effect (Wang et al., 2021). Therefore, whether it is the pandemic itself or the environmental and economic changes caused by the pandemic, it may become a risk factor affecting the psychological state of college students.

Developed countries aim to study the sustainability of education while developing countries pay more attention to economic sustainability during the pandemic

(Wang and Huang, 2021). Compared with research on economic development, there is a lack of research on the impact of the pandemic on education in China, and research related to mental health education is even scarcer. Besides, many existing studies have focused on the mental health status of the population, most have focused on the general population or health care workers, so the results may not be suitable for college students (Chen et al., 2020; Gao et al., 2020; Feng and Zhang, 2021). During the pandemic, there is still little research on whether the general public's mental state characteristics are suitable for college students. Meanwhile, in the current research on college students, the research on influencing factors often ignores general information such as gender, ethnicity and region, but focuses on their identities as students and children. What's more, the selection of samples is often limited, such as confined to a certain university, a certain major, etc. Moreover, most of the current research conducts horizontal surveys at the same time (Wise et al., 2020). Few researchers conduct longitudinal surveys of college students' mental health in stages.

Thus, based on the existing literature, this study changes the selection of influencing factors and selects the general information of college students and the characteristic information of their identity as the variables. At the same time, the social environment, namely the development of the pandemic, is the most important variable in comprehensively examining the influence of personal and social factors on the mental health of college students. Our innovation is to conduct a longitudinal survey of college students' mental state in three stages within one and a half years. In conclusion, this work has contributed to the existing literature in the following two aspects. First, the dynamic changes in the mental state of the college student population with the normalization of the COVID-19 pandemic appear to be particularly important, but there are few studies in this area. Our research fills this gap and can predict future development based on the dynamic trend of changes in the psychological state of college students. Second, the research on the influencing factors in this paper can give suggestions to colleges and universities to implement measures to improve the psychological state of college students.

## MATERIALS AND METHODS

### Participants

The participants of the survey are college students in China, including five colleges and over 20 classes around Xuzhou, Jiangsu Province. All participants were randomly recruited and voluntarily participated. They wrote informed consent before completing the study questionnaire.

### Survey Period

This survey period was conducted in three phases. The first phase of the survey is from February to March 2020, the second phase is from August to September 2020, and the third phase is from July to August 2021. The reason for choosing the first period is that March 2020 was the first month when the Chinese

government activated level-1 public health emergency responses in 31 provincial-level regions in mainland China (Huang et al., 2020). The second phase of August to September 2020 is selected because of Joint Prevention and Control Mechanism of the State Council issued the "Guiding Opinions on Doing a Good Job in the Normalization of the Prevention and Control of the COVID-19 pandemic" on May 7, 2020. Which mentioned that the pandemic has entered the period of normalization of prevention and control at this time, and the students who were surveyed from August to September returned to school, so that we can conduct the questionnaire survey. The reason why the last phase chose August 2021 is the pandemic situation in Nanjing, Chengdu, and other places became serious in July 2021. There were sporadic cases of the pandemic, which may have an impact on the mental health of students.

### Investigation

In the first phase of the survey, the participants were contacted by the counselors of universities and issued questionnaires to the classes they managed. The monitor of each class will ask participants to take screenshots of their mobile phones at the end of the survey to prove that the students in the class have completed the survey. Then we count the number of completions and record the identity of the participants. We collected information on the number of participants from various counselors and teachers, continued to distribute the questionnaires to the students who had filled in the questionnaires in the second and third phases of the survey, and urged them to complete the questionnaires to ensure that this longitudinal survey was all from the same students' reply. The first phase received 403 questionnaires, the second phase received 384 questionnaires, and the third phase received 385 questionnaires. We finally obtained 384 valid samples, which are guaranteed to be from the same student's responses at different times, after excluding some question samples that failed to participate in the survey three times.

### Research Tool

We conduct research by distributing questionnaires. All students receive surveys on general information, recognition of the epidemic, sources of fear, mental health, and behavior change. (1) General information: gender, ethnicity, major, grade, and so on; (2) Recognition of the pandemic: the degree of recognition of the pandemic, the preventive measures of COVID-19, and so on; (3) Source of fear: fear of a highly contagious virus, fear of no specific treatment, and so on; (4) Mental health survey: generally happy, feel the interesting daily life, and so on; (5) Behavior change survey: pay attention to disinfection and wash hands frequently, and so on. The contents of the 2, 3, 4, and 5 parts are based on the "SARS Social Psychological Survey Questionnaire (National Version)" developed and compiled by the Institute of Psychology of the Chinese Academy of Sciences, combined with the COVID-19 pandemic, based on the original scale and made corresponding additions and deletions. The main part of the questionnaire uses the Likert five-level scale to score points. In the "mental states" part, positive mental states are counted as positive points,

and negative mental states are counted as negative points (Chuanfeng and Jianwen, 2003).

The main psychometric indicators included in our original questionnaire have two aspects: positive psychological state and negative psychological state. The positive psychological state includes generally happy, feeling interesting in daily life, being able to face problems bravely, focusing on doing things, I feel that I can make up my mind when doing things and feeling energetic; the negative psychological state includes feeling depressed and unhappy, feeling mentally stressed, feeling unable to overcome difficulties, feeling more emotional, feeling useless and insomnia because of worry. These were developed by the Institute of Psychology, the Chinese Academy of Sciences.

For the validity and reliability of the survey, the results of confirmatory factor analysis (CFA) of the source of fear survey showed that:  $\chi^2/df = 4.229$  ( $<5.0$ ), root mean square error of approximate (RMSEA) = 0.070, normal of fit index (NFI) = 0.961 ( $>0.9$ ), incremental fitting index (IFI) = 0.970 ( $>0.9$ ) and comparative fit index (CFI) = 0.970 ( $>0.9$ ). The results of Confirmatory Factor Analysis of other surveys also meet the requirements, which means that the validity of the original survey is good. Furthermore, the Cronbach's alpha for internal consistency for the use of our modified SARS Social Psychological Survey Questionnaire (National Version) was 0.907, which verifies the reliability of the survey.

## Statistical Analysis

In the data processing in this article, the quantitative data is expressed by  $M$  (P25, P75) on the psychological state score scale, fear source identification score scale and the behavior change score scale; qualitative data is expressed by the case (%); comparison between groups is expressed by Kruskal–Wallis  $H$  test; the influencing factors of students' psychological changes adopt hierarchical multiple regression analysis. All statistical analyses were performed using SPSS 23.0 for Windows (IBM, Somers, NY, United States). The structural equation model was constructed using AMOS 23.0 software (IBM, Somers, NY, United States) to verify the relationship between variables and the mediation effect, and the Bootstrap method was used to test the mediating effect. The difference is statistically significant when  $p < 0.05$ .

## RESULTS

### Demographic Characteristics

The demographic characteristics of all subjects are summarized in **Table 1**. The number of valid questionnaires returned was 384, the main population distribution was 142 males, accounting for 37%, 242 females, accounting for 63%; 359 Han nationalities, accounting for 93.5%, 25 non-Han nationalities, accounting for 6.5%; 261 medical students, accounting for 68%, 123 students from other majors, accounting for 32%; 282 first and second-grade students, accounting for 73.5%, 102 third to fifth-grade students, accounting for 26.6%; 182 student leaders, accounting for 47.4%, non-student leaders 202 people, accounting for 52.6%.

**TABLE 1 |** Demographic characteristics of participants.

Variables	N	Proportion (%)
<b>Gender</b>		
Male	142	37
Female	242	63
<b>Ethnicity</b>		
Han nationality	359	93.5
Non-Han nationality	25	6.5
<b>Major</b>		
Medical major	261	68
Non-medical major	123	32
<b>Grade</b>		
1	165	43
2	117	30.5
3	46	12
4	55	14.3
5	1	0.3
<b>Whether a student cadre</b>		
Yes	182	47.4
No	202	52.6

### Mental State Scale Score

As shown in **Tables 2, 3**, during the entire survey period, from the perspective of positive indicators (the larger the positive indicator, the better the mental state of the people). The respondents agree with most indicators to a higher degree: they feel that they are happy, able to concentrate, etc. It can be seen that the mentality of college students is more inclined to be optimistic. From the first phase to the second phase, the positive index rises quickly, but the second phase and the third phase rise are not obvious, the negative index correspondingly declines. Besides, generally happy, feel the interesting in daily life, able to face problems bravely, focus on doing things, feel that I can make up my mind when doing things, feel energetic, project total score, feel depressed and unhappy, feel mentally stressed, feel unable to overcome difficulties, feel more emotional, feel useless, insomnia because of worry, and project total score showed significant differences among three stages ( $p < 0.05$ ).

### Hierarchical Multiple Regression Analysis

Take Gender, Ethnicity, Grade, Major, whether a student leader as control variables, recognition of the pandemic, fear of a highly contagious virus, fear of no specific treatment, fear of the emergence of sporadic cases as independent variables. The total mental state score of the first stage, the total mental state score of the second stage, and the total mental state score of the third stage were included in the hierarchical linear regression as the dependent variable. As shown in **Table 4**, the mental health status of this group of college students has different influencing factors in different periods. Among them, ethnicity, major, and the recognition of the pandemic directly affect their mental health in the first stage; the direct influencing factors in the second stage are grade, the recognition of the pandemic, and the fear of infectiousness of the virus; and the direct influencing factors



**TABLE 2 |** Score of college students' positive mental state scale and Kruskal–Wallis *H* test in the three stages of the pandemic [Points, *M* (P25, P75)].

Project	Phase 1	Phase 2	Phase 3	<i>H</i> -value	<i>p</i> -value
Generally happy	4 (3, 4)	4 (3, 5)	4 (4, 5)	12.855	0.002
Feel the interesting in daily life	4 (3, 4)	4 (3, 4)	4 (3, 5)	17.941	<0.001
Able to face problems bravely	4 (3, 4)	4 (4, 5)	4 (4, 5)	13.400	0.001
Focus on doing things	4 (3, 4)	4 (3, 4)	4 (3, 4)	10.635	0.005
I feel that I can make up my mind when doing things	4 (3, 4)	4 (3, 4)	4 (3, 5)	18.744	<0.001
Feel energetic	4 (3, 4)	4 (3, 4)	4 (3, 4)	23.267	<0.001
Project total score	22 (19, 25)	23 (20, 25)	24 (20, 27)	22.357	<0.001

**TABLE 3 |** Score of college students' negative mental state scale and Kruskal–Wallis *H* test in the three stages of the pandemic [Points, *M* (P25, P75)].

Project	Phase 1	Phase 2	Phase 3	<i>H</i> -value	<i>p</i> -value
Feel depressed and unhappy	3 (2, 4)	2 (2, 3)	2 (2, 3)	34.046	<0.001
Feel mentally stressed	3 (2, 4)	2 (2, 3)	2 (2, 3)	65.122	<0.001
Feel unable to overcome difficulties	3 (2, 4)	2 (2, 3)	2 (2, 3)	54.618	<0.001
Feel more emotional	3 (2, 4)	2 (2, 3)	2 (2, 3)	69.400	<0.001
Feel useless	3 (2, 4)	2 (2, 3)	2 (1, 3)	50.225	<0.001
Insomnia because of worry	3 (2, 4)	2 (1, 3)	2 (1, 3)	85.467	<0.001
Project total score	17.5 (13, 22)	14 (12, 17)	14 (11, 18)	88.848	<0.001

State frequency values 1–3–5, representing “never”–“sometimes”–“frequently” and other different degrees; other numerical meanings are between these situations.

in the third stage are ethnicity, grade, and degree of recognition about the pandemic. The independent variable explains the dependent variable 22.4, 10.8, and 8.6% variation. Besides, there is no multicollinearity between the data (Supplementary Table 1).

## Fear Source Identification Score Scale, and the Behavior Change Score Scale

As shown in Table 5, among the five sources of college students' fear of the pandemic, only “Negative news from the web” showed significant differences among the three stages ( $p < 0.05$ ). As shown in Table 6, “No cold symptoms but also take some drugs to prevent it,” “Start eating heavily to relieve your emotions,” “Do what you usually have no time to do,” “Smoking and drinking are even more popular than usual,” and “Pray for ancestors or gods,” the differences in the scores of the three stages were statistically significant ( $p < 0.05$ ).

## Establishment of the Mediating Effect Model

Using AMOS 23.0 software, using the source of fear as the independent variable, behavioral change as the mediator, and psychological change as the dependent variable, a structural equation model was established, and the Maximum Likelihood Estimate was used to modify and fit the model to test the hypothesis. The model fit results showed:  $\chi^2/df = 2.013$ , root mean square error of approximate (RMSEA) = 0.077, goodness-of-fit index (GFI) = 0.953 ( $> 0.9$ ), adjusted goodness-of-fit index (AGFI) = 0.928 ( $> 0.9$ ), normal of fit index (NFI) = 0.943 ( $> 0.9$ ), incremental fitting index (IFI) = 0.950 ( $> 0.9$ ), comparative fit index (CFI) = 0.950 ( $> 0.9$ ), which means the model fits well, and each path coefficient is statistically significant ( $p < 0.05$ ), indicating that the mediating effect test is feasible. The final fitting model and standardized path coefficients are

**TABLE 4 |** Hierarchical multiple regression analysis of influencing factors of college students' psychological changes.

Variable	Dependent variable: Total mental state score		
	Phase 1	Phase 2	Phase 3
Controlled variable			
Gender	0.039	−0.029	0.021
Ethnicity	−0.103*	−0.006	−0.119*
Grade	−0.014	−0.143**	−0.173***
Major	0.214***	−0.099	0.030
Whether a student leader	0.073	−0.062	−0.018
Independent variable			
Recognition to the pandemic	−0.180***	−0.114*	−0.174***
Fear of a highly contagious virus	0.250***	0.150*	0.083
Fear of no specific treatment	−0.041	0.32	−0.056
Fear of the emergence of sporadic cases	0.068	0.095	−0.032
R <sup>2</sup>	0.224	0.108	0.086
F	12.565***	5.028***	3.915**
ΔR <sup>2</sup>	0.070	0.043	0.043
ΔF	7.044***	3.570**	3.525**

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

shown in Figure 1. The Bias-Corrected Bootstrap method was further used to test the significance of the mediating effect. Repeated sampling was repeated 5,000 times. The results showed that the 95% CI of the direct and indirect effects of the source of fear and psychological changes does not include 0 ( $p < 0.05$ ). The mediating effect is significant, indicating that the behavioral performance has a partial mediating effect between the source of fear and psychological changes. See Table 7.

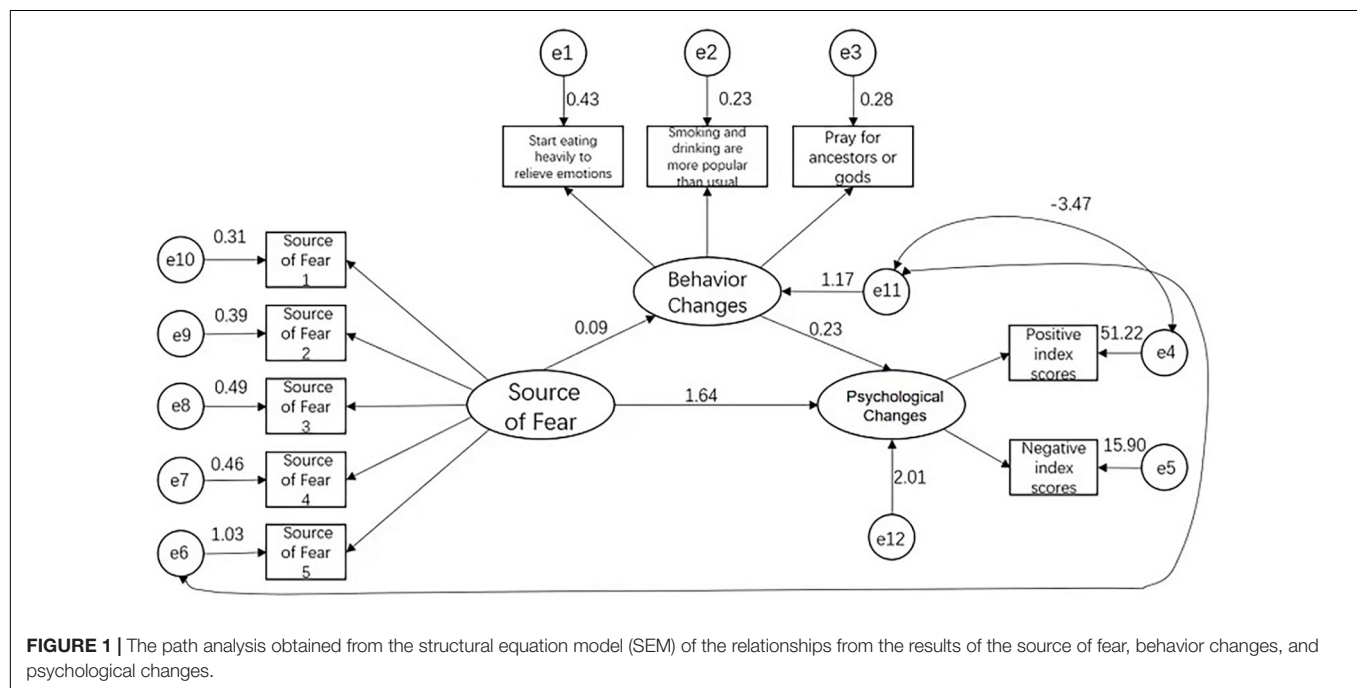


**TABLE 5 |** The Kruskal–Wallis  $H$  test scores of college students' identification with the source of fear in three stages of the pandemic [Points,  $M$  (P25, P75)].

Project	Phase 1	Phase 2	Phase 3	$H$ -value	$p$ -value
Viral infectivity is strong	4 (3, 5)	4 (4, 5)	4 (4, 5)	4.259	0.119
The virus could lead to death	4 (3, 4)	4 (3, 5)	4 (3, 5)	4.724	0.094
There is no quick and effective treatment available yet	4 (3, 4)	4 (3, 4)	4 (3, 4)	5.793	0.055
The increase in confirmed diagnoses is widely reported	4 (3, 4)	4 (3, 4)	4 (3, 4)	2.790	0.248
Negative news from the web	3 (3, 4)	3 (2, 4)	3 (2, 4)	9.327	0.009

**TABLE 6 |** Behavior change scale for college students and Kruskal–Wallis  $H$  test score in three stages of pandemic [Points,  $M$  (P25, P75)].

Project	Phase 1	Phase 2	Phase 3	$H$ -value	$p$ -value
Pay attention to disinfection and wash hands frequently	4 (3, 5)	4 (3, 5)	4 (3, 5)	0.695	0.706
Minimize contact with others	4 (3, 5)	4 (3, 5)	4 (3, 5)	2.534	0.282
More concerned about the media release than usual	4 (3, 5)	4 (3, 5)	4 (3, 5)	1.404	0.496
Provide people around you with ways to prevent the pandemic	4 (3, 5)	4 (3, 5)	4 (3, 5)	0.752	0.687
No cold symptoms but also take some drugs to prevent it	3 (2, 4)	2 (1, 3)	2 (1, 3)	45.911	<0.001
Start eating heavily to relieve emotions	2 (2, 4)	2 (1, 2)	2 (1, 2)	90.908	<0.001
Do what you usually have no time to do	3 (3, 4)	3 (2, 4)	3 (2, 4)	65.867	<0.001
Smoking and drinking are even more popular than usual	2 (1, 4)	1 (1, 2)	1 (1, 2)	106.284	<0.001
Pray for ancestors or gods	2 (1, 4)	1 (1, 2)	1 (1, 2)	96.446	<0.001



## DISCUSSION

Different individuals have different personality tendencies, physical conditions, social identities, and risk perception abilities, which makes their impact on the COVID-19 pandemic have individual differences. This study believes that recognition of the pandemic is an important factor that significantly affects the psychological state of college students in all three stages. In the early stage of the outbreak, although the number of

confirmed cases continued to rise, more positive news came along with the progress of virus research and the increase in discharge cure rates, which can affect the psychological state of students. According to recent research, the key to China's success in avoiding a second wave of the COVID-19 pandemic is the large-scale integration of digital technology and public health without hesitation (Wang et al., 2021). Through this college students can receive COVID-19-related information such as the number of confirmed cases and the

**TABLE 7 |** Mediating effect.

Path	Effect size	Standard error	95% CI	p-value
Mediating effect	0.022	0.018	0.000, 0.117	0.045
Direct effect	1.642	0.264	1.133, 2.154	0.000
Total effect	1.642	0.266	1.150, 2.178	0.000

activity range of confirmed persons, to improve their recognition of the pandemic. On the one hand, cognitive appraisals were differentially related to negative emotion, positive emotion and sleep problems (Li J. B. et al., 2020). In the cultural environment of China, people's behavior is easy to follow "feeling," which determines that perception and belief play an important role in their behavior selection. Therefore, it is very important to correct the wrong "feeling" of college students. We need to use reasonable strategies to let them know the correct information and get rid of false beliefs and perceptions. On the other hand, Muzi et al. (2021) found that teenagers during pandemics showed more social media use problems than in pre-pandemic samples. Besides, studies have found that frequent use of social media during the pandemic can lead to information overload and over concern among individuals, which may increase the negative emotions of college students (Farooq et al., 2020; Muzi et al., 2021). Therefore, ignorantly encouraging students to pay attention to the pandemic-related information on the Internet is not a wise strategy for college students, but should reduce information overload via the clear structuring and communication of reliable health information.

The mental state of non-Han minority students is worse than that of Han students. First, in recent years, more and more ethnic minority college students have entered university gates. Due to differences in ethnic culture, language, and living habits, it is not very easy for ethnic minority students to adapt to a new environment in a short period. At the same time, this is a huge process of physical and psychological transformation for them (Haiyi, 2017). Second, some ethnic minority students lack good self-regulation ability and are more likely to have different degrees of psychological problems than Han students. There is currently a lack of research on the psychological state of Chinese ethnic minority college students during the pandemic. However, the research by Trammell found that Latinx and Asian students experienced higher COVID-19-related threats and negative beliefs than White students. Asian students experienced more discrimination (Trammell et al., 2021). The results showed that the psychosocial impacts of a pandemic on students vary by race/ethnicity.

Major is also a factor that affects the psychological state of college students. The survey results show that medical students have better mental health status than non-medical students. It may be because medical students can use the professional knowledge they have learned to distinguish the authenticity of online news. They have more understanding of modern medical technology and level, and national health policies, so they will have fewer negative emotions such as fear and anxiety.

An Israeli survey shows that the high overall satisfaction rate with online learning along with low technical difficulties was closely correlated to the desire to continue online learning ( $p < 0.01$ ) (Sandhaus et al., 2020). Satisfaction with online learning may also improve the mental state of college students. But another American survey found that a total of 741 medical students (74.7%) believed that the pandemic had seriously disrupted their medical education, since the beginning of the pandemic, self-reported emotional exhaustion and burnout have increased statistically significantly ( $p < 0.001$ ) (Harries et al., 2021). Another study of 549 medical students found that 341 (62.3%), 410 (74.6%), 344 (62.6%), and 379 (69%) had self-reported anxiety, depression, insomnia, and distress (Essangri et al., 2021). The reason why the above survey contradicts our research results may be that most of our participants are freshmen to juniors, and few students have already participated in clinical work or are facing clinical offline courses, so they do not feel anxious about such courses. It may also be because the students are not professionally mature enough to deal with one of the most serious public health crises in the world (Zheng et al., 2021).

It can also be concluded from **Table 1** that the development and changes of the pandemic have a significant impact on the psychological state of college students. First of all, because the development of the pandemic is uncontrollable and uncertain for the masses, it is easy to cause a series of related psychological problems such as anxiety and depression. Because the age of the students are suffering from severe acute respiratory syndrome (SARS) is still young. They have not been exposed to such public health incidents (Xiaofei and Dongmei, 2005). This kind of unknown public health incident may exacerbate the negative psychology of college students. Meanwhile, another study showed that the public's psychological condition has changed in stages with the development of the pandemic (Yaner, 2020). The results of this study showed that this phased change changes with the overall severity of the pandemic. For students in different regions, studies have shown that with the increase in the cumulative number of confirmed cases in the local area (Fang and Bing, 2020), public psychology tends to be tense and negative. Most studies now believe that if the pandemic situation worsens, people's psychological state will worsen with it. The results of our study were in line with this trend in the first to second stages. On the contrary, with the repeated outbreak of the epidemic in the third stage, the psychological state of the students improved slightly. There may be two reasons for this. First, the three-stage epidemic is not as sudden and severe as when the epidemic first broke out. College students at this time have already experienced the impact of the pandemic and are not easily affected anymore. Second, before August 2021, colleges and universities have implemented effective psychological counseling measures for college students, which can help promptly even when the epidemic worsens. But another survey showed that the level of exposure to COVID-19 in China was negatively associated with mental health problems, which confirmed the "Psychological Typhoon Eye" effect (Zhang et al., 2020). Therefore, when doing psychological counseling for college

students, especially during the holidays, the psychological state of students in non-risk areas should not be ignored, and should pay the same attention to students in high-risk areas.

The impact of unhealthy behavior on the mental state should be valued. From **Table 5**, starting to eat a lot to relieve emotions, smoking and drinking more than usual, and praying for ancestors or gods' blessings are all affected by the development and changes of the pandemic. In the general population, both increased restricting and binge eating behaviors were reported (Phillipou et al., 2020). Binge eating, alcoholism, and worship are all unhealthy behavioral measures to cope with COVID-19. Studies have shown that binge eating can temporarily improve mood, and individuals may also reduce negative emotions through binge eating (Crowther et al., 2001). Both binge eating and alcoholism can be seen as the result of diverting the individual's attention to the surrounding environment to escape negative emotions. While worshipping is looking for psychological support to eliminate negative emotions. However, the above irrational behaviors may cause more serious consequences for mental health. Individuals with binge eating reported more stress events, lower tolerance for negative emotions, and greater difficulties in emotional awareness (such as alexithymia, psycho sensory disturbance, etc.) (Zeeck et al., 2011). The present study found that the relationships between fear of COVID-19, changes in psychological state, and unhealthy behavior in **Figure 1** were significant. The mediating effect analysis shows that the unhealthy behavior in **Figure 1** plays a partially mediating role in fear of COVID-19 and changes in psychological state. Research has shown that the fear of COVID-19 facilitates the development of psychiatric symptoms among those who previously did not experience mental illness (Shigemura et al., 2020). Some studies revealed that preventive health behavior has a positive relationship with fear of COVID-19 but a negative relationship with psychological distress (Olapegba et al., 2021). The different feelings about the source of pandemic fear are due to the different degree and breadth of students' cognition of it. According to SCRC theory, individuals will have psychological and emotional reactions after cognitive assessment and then adopt crisis response behaviors. However, the mediating effect results of this study show that cognition indirectly affects psychological changes through behavioral changes. In general, according to the results of this research, we believe that the relationship between recognition, psychological, and behavioral changes is not static, but a dynamic and mutually influencing relationship between them.

This study has several strengths. We have collected a large and geographically diverse sample during the COVID-19 pandemic. Importantly, the current research about college students' mental health during the COVID-19 pandemic is mainly from a static period at present, this study is an initial effort to explore changes in college students' psychological status during pandemic normalization. Our research is not only critical to our understanding and handling of the psychological consequences of college students but also to help predict future mental states. Based on previous research on infectious diseases (such as SARS), the research makes

recommendations for colleges and universities to prevent college students from developing psychological problems. We investigated the effect of cognition on the psychological state of college students, we should improve college students' awareness of the pandemic while simultaneously avoiding information overload. In addition, the mediating role of behavioral changes between recognition and mental state changes also reminds us that students with abnormal behaviors cannot be ignored.

However, the current study has several limitations. First, although the current study recruited a wide range of college students for the survey, the sample size of the questionnaire did not cover all regions and major cities across the country. Therefore, the conclusions cannot accurately infer differences in demographic variables. Besides, all the participants are from China and cannot represent all the countries and cultures. Future research can be conducted on a larger scale and get more comprehensive data. Second, the open recruitment method via the internet also has its drawbacks. Our sample most are for medical students (68%). Potentially, Medical students may be more willing to participate in the study. The lower proportion of negative emotions such as anxiety, and depression among medical students may interfere with the overall mental state score. Additionally, the major makeup and recruitment method may lead to findings not being representative of the larger Chinese university student population. Third, given the study's mediating effect, the relationship between cognitive degree, mental state changes, and behavioral changes cannot be ascertained. What this study can determine is that the cognitive degree can have a certain impact on the psychological state of college students by changing their behavior, this could be due to those who have lower recognition of the pandemic being more likely to engage in actions as a coping. But whether behavior can directly affect the mental state changes or vice versa, is still unclear. Future studies may explore these associations. The generalization of conclusions has yet to be tested through more investigations. Finally, our discussion of influencing factors is relatively simple. Some studies have pointed out that the COVID-19 pandemic has affected various aspects such as the social environment and economy to varying degrees (Wang and Su, 2020; Wang and Zhang, 2021). How will these indirect factors affect the mental health of college students? This is what we will consider in future research. These interesting problems mentioned above deserve further study.

## CONCLUSION

With the effective control of the pandemic, the mental state of the students showed a slight improvement in the environment of sporadic cases. Behavior has a partial mediating effect between the source of fear and psychological changes. Correct behavior guidance can effectively reduce the psychological changes caused by college students' fear. This is of great significance for universities to take correct intervention measures for the problems of college students' psychological state 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.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Asia University Medical Research Ethics Committee. Written informed consent for participation was not required for this study in accordance with the National Legislation and the Institutional Requirements.

## AUTHOR CONTRIBUTIONS

CL, JT, and WH participated in the study design. CS, JT, XZ, BS, and EB carried out the surveys. CS and CL performed the

statistical analysis. XZ, EB, and WH contributed to the analysis. JT, XZ, and CL wrote the manuscript. All authors read and approved the final 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/fpsyg.2022.891778/full#supplementary-material>

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# Burnout Among School Teachers During the COVID-19 Pandemic in Jazan Region, Saudi Arabia

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**Background:** Burnout is a syndrome that results from stressors in the work environment that have not been successfully managed. The prevalence of burnout among schoolteachers was always controversial. COVID-19 pandemic added more stressors to teachers since they had to change their working styles in response to the pandemic lockdowns or curfews. In Saudi Arabia, the prevalence and determinants of burnout among school teachers were not measured by any other group during the COVID-19 pandemic stressors.

**Methods:** A cross-sectional survey was conducted among 879 teachers in the Jazan region, Saudi Arabia, using the Maslach Burnout Inventory (MBI), during April 2021. Multistage cluster random sampling was used.

**Results:** The mean age of the participants was 41.4 ( $\pm 6.9$ ) years. Male teachers represented 52.6% of the participants while females represented 47.4%. Most teachers showed burnout symptoms (69.6%). Consequences of burnout were observed, such as using psychotropic medications (4.6%), absenteeism (45.6%), lack of job satisfaction (7.7%), and changing schools (15.8%). Using the MBI scale, most teachers showed medium or high emotional exhaustion (57.6%), low depersonalization (62.2%), and low personal accomplishment (51.4%).

**Conclusion:** Most teachers showed symptoms of burnout during the COVID-19 pandemic. Being an expert and ability to adapt to technology during the COVID-19 pandemic proved to effectively reduce burnout symptoms. Increasing incentives, early detection, and improving the work environment is recommended to diminish burnout consequences.

**Keywords:** burnout, COVID-19, environmental health, Maslach Burnout Inventory, occupational health, Saudi Arabia, teachers

## INTRODUCTION

Burnout was defined as “a psychological syndrome emerging as a prolonged response to chronic interpersonal stressors on the job” (Maslach and Leiter, 2016). That is why it is considered as an occupational, psychological syndrome (Montero-Marin et al., 2009; Njim et al., 2019; Raymaker et al., 2020). It is usually developed in response to poor working circumstances, interpersonal interactions, poor work management, and administration (Moueleu Ngalagou et al., 2019; Ndongo et al., 2020; Civilotti et al., 2021; Goldstein and Alesbury, 2021; Losung et al., 2021; Sener et al., 2021; Wirkus et al., 2021). It usually affects medical professionals, teachers, police officers, army soldiers, as well as many other professionals (Burki, 2020; Ndongo et al., 2020; Goldstein and Alesbury, 2021; Grupe et al., 2021; Llorca-Pellicer et al., 2021; Mák et al., 2021; Márquez et al., 2021; Ribeiro et al., 2021; Righi et al., 2021; Wirkus et al., 2021). The syndrome is characterized by various symptoms ranging from emotional to psychiatric, cognitive, and psychosomatic symptoms with different severities (Bauer et al., 2006; Schilling et al., 2019; Lass-Hennemann et al., 2020; Civilotti et al., 2021; Juczynski and Oginska-Bulik, 2021; Oginska-Bulik and Juczynski, 2021; Righi et al., 2021). On the other hand, some studies detected relations between burnout and the personality types, emotional and spiritual intelligence (Pishghadam, 2012; Pishghadam et al., 2022). May be that why it could lead to premature retirement or even suicide in severe cases (Bauer et al., 2006; Christopher et al., 2020; Queiros et al., 2020; Harvey et al., 2021). Although some studies reported a low provenance of around 5% or less among teachers (Purdy et al., 1987; Maric et al., 2020; Pereira et al., 2021). Other studies reported a prevalence of 21% among Tunisian teachers and 24.5% among Iraqi teachers (Chennoufi et al., 2012; Al-Asadi et al., 2018).

Since December 2019, with the outbreak of the COVID-19 pandemic, burnout has increased dramatically not only among healthcare professionals but also among other professions (Afulani et al., 2021; Ma et al., 2021; Naldi et al., 2021; Oksanen et al., 2021). This would be due to changing work and lifestyles in response to the lockdowns and curfew that pushed the government to adopt working from home for some professions (Prado-Gasco et al., 2020; Price, 2020; Suliman et al., 2021).

The Kingdom of Saudi Arabia was also affected by the COVID-19 pandemic. Although the Ministry of Health implemented prevention strategies early in March 2020, the prevalence of COVID-19 increased to the extent that the Kingdom decided to go into lockdown for months and even partial or full curfew for sometimes (Alsofayan et al., 2020; MOH, 2020). In Saudi Arabia, the majority (73%) of teachers reported that they received online learning experiences and can support student learning through digital technology (Mann et al., 2020). However, challenges for teachers were raised during the COVID-19 pandemic, such as the inability to access modern technology, poor internet connection, and learner's lack of motivation (Hakim, 2020). Consequently, schools and universities started employing online teaching strategies that were not previously used. These strategies put the teachers under different pressures to the extent that they might have experienced

burnout (Raymaker et al., 2020). Moreover, data on burnout among school teacher in Saudi Arabia is scarce and nearly absent. That is why we hypothesized that these stressful conditions would positively affect the prevalence of burnout among school teachers. So, we aimed in this study to measure burnout prevalence and identify its determinants, among teachers in the Jazan region, in the far southwest of Saudi Arabia.

## MATERIALS AND METHODS

### Study Design and Sample Size Calculation

We conducted a cross-sectional study involved 879 teachers of the Jazan region, in all levels of public and private schools in Saudi Arabia during April 2021.

The minimum sample size was calculated to be 844 teachers. It was calculated using the following formula (Pourhoseingholi et al., 2013):

$$n = \frac{Z^2 P (1 - P)}{d^2}$$

Where,  $n$  = Sample size.

$Z$  = The level of confidence. We used level of confidence of 95% so we used  $Z = 1.96$ .

$P$  = The expected prevalence. As the prevalence was unknown among teachers in Jazan we used 50%.

$d$  = The precision (corresponding to the effect size). We used 5,

$$\text{So } n = \frac{(1.96)^2 \times 50 \times 50}{5^2} = 384$$

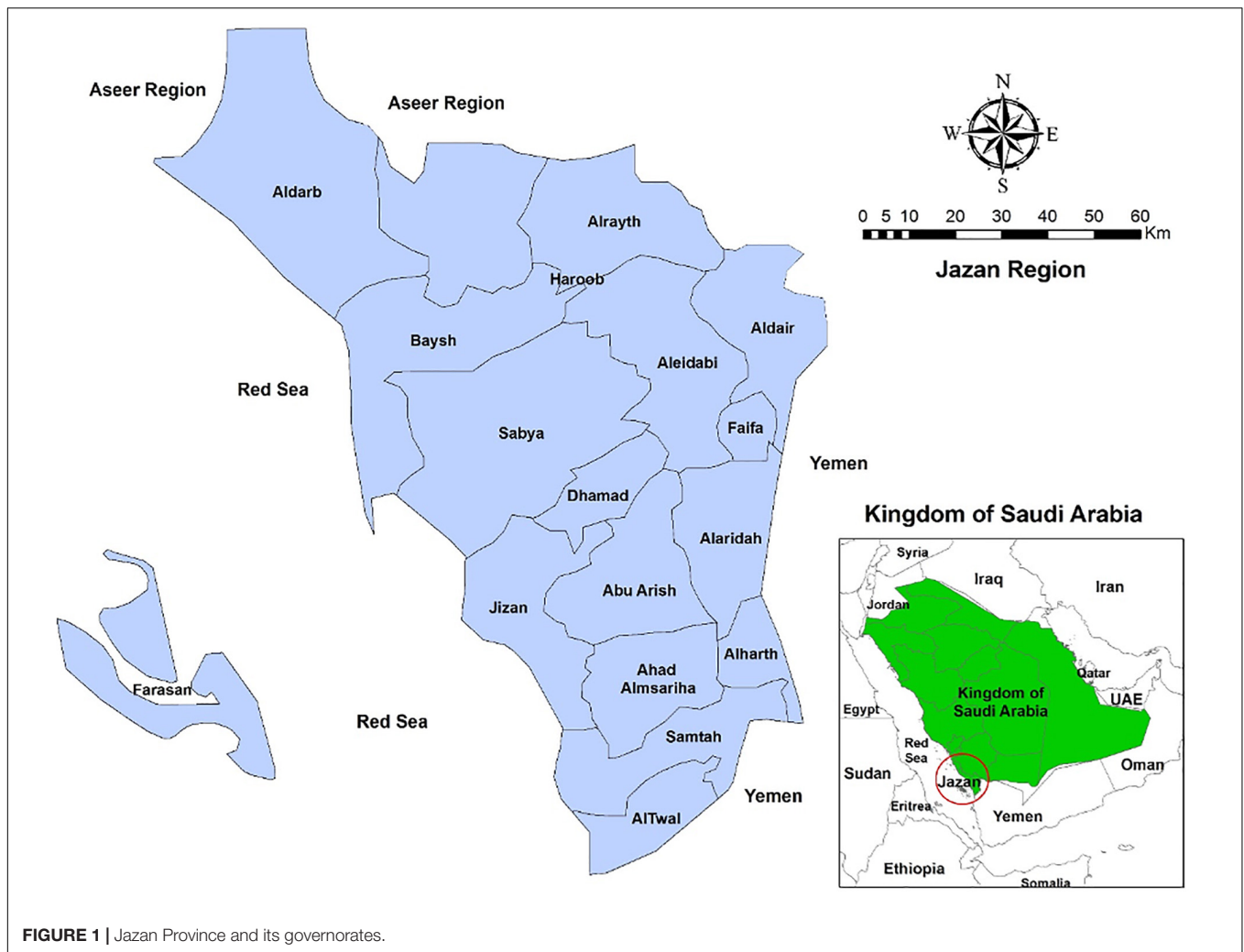
We duplicated the sample size to reduce the cluster effect and considered 10% as non-response rate. So the sample size was calculated to be 844.

### Sampling Technique and Study Population

We used a multistage cluster random sampling technique in this study. Jazan Province is one of the 13 provinces of Saudi Arabia. It is a highly populated (1.2 million) province that lies at the far southwest of the Kingdom. It is further subdivided into 13 governorates with Jazan City as a capital (Figure 1).

From educational point of view, Jazan province is divided into two educational directorates namely, Jazan and Sabya. Jazan directorate included six administrative offices and Sabya directorate included nine administrative offices. Each administrative office was supervising a number of schools of all levels (Primary, Intermediate, and High Schools).

We randomly chose three offices from each directorate using simple random sample technique. Subsequently, according to the school level, the schools in each education office were stratified into three strata (primary, intermediate, and secondary schools). Then using a systematic random technique, we chose two boys' and two girls' schools from each of the three school levels. So we ended up with 72 schools (24 primary, 24 middle, and 24 high schools). In the last stage, we invited all teachers (1,032) of all targeted schools to participate in the study. We received 879 completed questionnaires. The response rate was 85.2%.



## Study Tool

We used an online Google Forms Arabic questionnaire, including three main parts, to collect the data from the teachers.

The first part included questions regarding school teachers' demographic and professional characteristics. These characteristics included; age, gender, marital status, number of children, level of education, residency, monthly income, school type, teaching level, his/her role/s in the school, number of working years, main daily teaching hours and main daily hours spent in preparation of lectures and other activities to be delivered to the students.

The second part of the questionnaire included questions on physical and mental health, social aspects, and future career plans. This section included questions about past history of treatment for depression or anxiety during the past 5 years, absenteeism during the COVID-19 pandemic, job satisfaction and planning to leave the school to another.

The third part included the validated Arabic version of Maslach Burnout Inventory (MBI) for educators (Abu-Hilal and Salameh, 1992; Maslach et al., 1996; Nesraoui and Zeroual, 2017; Chalhaf et al., 2019). This inventory is made up of

22 items on a 0–6 scale. These items were generated to measure the 3 components of burn out; emotional exhaustion, depersonalization, and personal accomplishment. We analyzed these components according to a previous study to describe each component as yes or no (Heidari and Gorjian, 2017). We then considered yes = 1 and no = 0. We then considered summation of the three components to get “No burnout” when the sum of the three components = 0, “Mild burnout” when the sum equal = 1, “Moderate burnout” when the sum = 2 and “Severe burnout” when the sum = 3.

Before data collection, a pilot study was conducted to test whether the questionnaire's wording was clear and understandable, as it was a translated version in Arabic. The reliability of the questionnaire was calculated using the Cronbach's alpha test.

## Statistical Analysis

The collected data were coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 22.0, IBM Corp., Chicago, IL, United States, 2013 and Microsoft Office Excel 2007. Descriptive

statistics were calculated for qualitative data as numbers and percentages. In contrast, inferential analyses were performed using the Chi-square test for differences between proportions and Fisher's exact test for variables with small, expected numbers. A logistic regression model was used to identify independent factors affecting burnout and its subscales, and the selection of grades based on an in-depth analysis of each subscale. The level of significance was set at a  $P$ -value of  $< 0.050$ .

## Ethical Consideration

The study was approved by the Jazan University Scientific Research Ethics Committee (reference number REC42/1/014). Teachers who agreed to participate in the study read, understood, and accepted online consent forms. All participants were informed of their right to not participate or withdraw from the study at any time. The privacy and confidentiality of the data was maintained.

## RESULTS

Performing Cronbach's alpha test for our data showed that the emotional, personal accomplishment and for the whole scales were highly reliable (0.89, 0.87, and 0.90, respectively) and acceptable for the depersonalization scale (0.65). This data is not shown here but in the annex (1).

**Table 1** shows the relationship between participants' characteristics and their levels of burnout. A total of 879 teachers agreed to participate in the survey. Most of them (81.7%) were between 30 and 50 years. There were 462 male respondents, comprising 52.6% of the study sample, with a male-to-female ratio of 1.1. The majority (84.6%) of the study population were married, and 41.4% had more than three children. Approximately 88% of the participants had a bachelor's degree, and 90.2% worked in governmental schools. Most teachers (78.2%,  $n = 687$ ) worked only in teaching, while 157 (17.9%) had administrative roles. Regarding work experience, 376 (42.8%) had 10–20 years of teaching experience, 329 (37.4%) had more than 20 years of experience, and 174 (19.8%) had less than 10 years of experience. A total of 554 (63.0%) participants worked for 4–8 h a day. Participants aged 30–50 years, those who received salaries between SR 5,000 to 10,000, and those who lived in villages experienced significantly higher levels of burnout. Many demographic factors did not affect the levels of burnout among teachers. On the other hand, like age, residency, monthly income and the mean daily hours spent in preparation of the teaching materials were affecting the levels of the burnout among teachers. After using Bonferroni *post hoc* test for the chi square results, it was obvious that the middle age group (30–40 years) showed higher levels of moderate and severe burnout. Moreover, low monthly income ( $< 5,000$  SR) was more associated with no to mild burnout while higher monthly income was more associated with higher levels of burnout. Finally, longer time spent in preparing the teaching materials was slightly associated with severe levels of burnout.

**Table 2** shows the variables related to burnout among teachers, considering its severity. Among participating teachers ( $n = 879$ )

in the Jazan region, 440 (50.1%) experienced mild burnout, 131 (14.9%) experienced moderate burnout, and 40 (4.6%) experienced severe burnout. No burnout was recorded in 268 (30.5%) teachers. All the factors used were significantly associated with burn out. However, after using *post hoc* Bonferroni test we find that those who were still using antipsychotic drugs, those who had more than twice absenteeism, those who not or never satisfied with their jobs and those who were looking to change their schools were experiencing more moderate to severe burnout.

**Table 3** shows the correlations between factors affecting burnout and its subscales. Regarding moderate/severe burnout, time spent usually in preparing lectures and activities to be delivered to the students in the next days (preparation time) of  $\geq 2.0$  h was a significant risk factor for moderate/severe burnout, while age  $> 40$  years and living in a village were significant protective factors. Regarding medium/high emotional exhaustion, a bachelor's degree, teaching in preparatory schools (Teaching preparatory is grade 7–9), and time spent in preparing lectures and other activities to be delivered to the students (preparation time)  $> 2$  h were significant risk factors, while age  $> 40.0$  was a significant protective factor. The prevalence of emotional exhaustion was low in 373 (42.4%) participants, medium in 257 (29.2%) participants, and high in 249 (28.3%) participants. Depersonalization was low in 547 (62.2%) participants, medium in 174 (19.8%) participants, and high in 158 (18.0%) participants. Teaching for preparatory students, preparation time  $\geq 2.0$  h, and being male were significant risk factors, while residing in a village was a significant protective factor. Personal accomplishment was low in 452 (51.4%) participants, medium in 142 (16.2%) participants, and high in 285 (32.4%) participants. Notably, salary  $\geq 15000.0$  was a trigger factor for medium and high accomplishment.

## DISCUSSION

Many researchers used Maslach Burnout Inventory for educators all over the world. The inventory was reputedly validated in its original English language and in different languages including the Arabic language. We also validated the Arabic version of the inventory in our study. Our validation went with most of the other validation when the inventory showed higher Cronbach's alpha for the subsections of the emotional and personal accomplishment, 0.89 and 0.87, respectively. The inventory as a whole also showed high Cronbach's alpha (0.90). The only subscale that was questionable was the depersonalization subsection (Cronbach's alpha 0.65). We presented the data of the Cronbach's alpha tests in annex 1. Our results were in agreement of most of those who tested the validation of the inventory where always depersonalization subscales showed the lowest Cronbach's alpha (Abu-Hilal and Salameh, 1992; Shan and Gerstenberger, 2017; Szigeti et al., 2017; Chalghaf et al., 2019; Amri et al., 2021).

This study measured burnout and identified its determinants among teachers in the Jazan region in the far southwest of Saudi Arabia during the COVID-19 pandemic. Unfortunately, we could not find any published data on burnout among



**TABLE 1** | The general characteristics of study participants according to burnout risk factors ( $N = 879$ ).

Variables	Categories	All cases		Burnout			P-value
		( $N = 879$ )	No ( $N = 268$ )	Mild ( $N = 440$ )	Moderate ( $N = 131$ )	Severe ( $N = 40$ )	
Age grades (years) ( $n, \%$ )	<30	34 (3.9%)	12 (35.3%) <sup>a</sup>	18 (52.9%) <sup>a</sup>	3 (8.8%) <sup>a</sup>	1 (3.0%) <sup>a</sup>	0.016**
	30–40	299 (34.0%)	88 (29.4%) <sup>a</sup>	131 (43.8%) <sup>a</sup>	66 (22.1%) <sup>b</sup>	14 (4.7%) <sup>ab</sup>	
	40–50	419 (47.7%)	128 (30.5%) <sup>a</sup>	222 (53.0%) <sup>a</sup>	49 (11.7%) <sup>a</sup>	20 (4.8%) <sup>a</sup>	
	50–60	127 (14.4%)	40 (31.5%) <sup>a</sup>	69 (54.3%) <sup>a</sup>	13 (10.2%) <sup>a</sup>	5 (4.0%) <sup>a</sup>	
Gender ( $n, \%$ )	Male	462 (52.6%)	141 (30.5%)	225 (48.7%)	75 (16.3%)	21 (4.5%)	0.679 <sup>#</sup>
	Female	417 (47.4%)	127 (30.5%)	215 (51.5%)	56 (13.4%)	19 (4.6%)	
Marital status	Single	102 (11.6%)	38 (37.3%)	48 (47.1%)	7 (6.8%)	9 (8.8)	0.054 <sup>§</sup>
	Married	744 (84.6%)	220 (29.6%)	376 (50.5%)	118 (15.9%)	30 (4.0%)	
	Divorced/Widow	33 (3.8%)	10 (30.3%)	16 (48.5%)	6 (18.2%)	1 (3.0%)	
Number children	None	169 (19.2%)	60 (35.5%)	76 (45.0%)	21 (12.4%)	12 (7.1%)	0.158 <sup>#</sup>
	1–3	346 (39.4%)	104 (30.1%)	170 (49.1%)	60 (17.3%)	12 (3.5%)	
	>3	364 (41.4%)	104 (28.6%)	194 (53.3%)	50 (13.7%)	16 (4.4%)	
Education	Postgraduate	37 (4.2%)	17 (45.9%)	14 (37.8%)	4 (10.8%)	2 (5.5%)	0.128 <sup>#</sup>
	Bachelor	773 (87.9%)	236 (30.6%)	383 (49.5%)	117 (15.1%)	37 (4.8%)	
	Lower	69 (7.8%)	15 (21.8%)	43 (62.3%)	10 (14.5%)	1 (1.4%)	
Residence	City	405 (46.1%)	140 (34.6%) <sup>a</sup>	199 (49.1%) <sup>a</sup>	51 (12.6%) <sup>a</sup>	15 (3.7%) <sup>a</sup>	0.044**
	Village	474 (53.9%)	128 (27.0%) <sup>a</sup>	241 (50.8%) <sup>a</sup>	80 (16.9%) <sup>a</sup>	25 (5.3%) <sup>a</sup>	
Monthly income in Saudi riyals (1 USD = 3.75 SR)	<5,000	70 (8.0%)	25 (35.7%) <sup>a</sup>	29 (41.4%) <sup>a</sup>	13 (18.6%) <sup>a</sup>	3 (4.3%) <sup>a</sup>	0.002**
	5,000–10,000	100 (11.4%)	23 (23.0%) <sup>ab</sup>	66 (66.0%) <sup>b</sup>	8 (8.0%) <sup>a</sup>	3 (3.0%) <sup>ab</sup>	
	10,000–15,000	477 (54.3%)	134 (28.1%) <sup>a</sup>	236 (49.5%) <sup>ab</sup>	87 (18.2%) <sup>b</sup>	20 (4.2%) <sup>ab</sup>	
	≥15,000	232 (26.4%)	86 (37.1%) <sup>a</sup>	109 (47.0%) <sup>ab</sup>	23 (9.9%) <sup>b</sup>	14 (6.0%) <sup>ab</sup>	
School type	Governmental	793 (90.2%)	234 (29.5%)	403 (50.8%)	119 (6.4%)	37 (4.7%)	0.285 <sup>#</sup>
	Private	86 (9.8%)	34 (39.5%)	37 (43.0%)	12 (14.0%)	3 (3.5%)	
Teaching level	Primary	341 (38.8%)	102 (29.9%)	180 (52.8%)	48 (14.1%)	11 (3.2%)	0.579 <sup>#</sup>
	Preparatory	258 (29.4%)	76 (29.5%)	123 (47.6%)	44 (17.1%)	15 (5.8%)	
	High school	280 (31.9%)	90 (32.1%)	137 (48.9%)	39 (13.9%)	14 (5.1%)	
Role	Teaching	687 (78.2%)	213 (31.0%)	334 (48.6%)	108 (15.7%)	32 (4.7%)	0.353 <sup>#</sup>
	Administration	157 (17.9%)	45 (28.7%)	88 (56.1%)	16 (10.2%)	8 (5.0%)	
	Both	35 (4.0%)	10 (28.6%)	18 (51.4%)	7 (20.0%)	0 (0.0%)	
Working years	<10.0	174 (19.8%)	60 (34.5%)	75 (43.1%)	33 (19.0%)	6 (3.4%)	0.137 <sup>#</sup>
	10.0–<20.0	376 (42.8%)	105 (27.9%)	195 (51.8%)	60 (16.0%)	16 (4.3%)	
	≥20.0	329 (37.4%)	103 (31.3%)	170 (51.6%)	38 (11.6%)	18 (5.5%)	
Mean of daily teaching hours	<4.0	195 (22.2%)	65 (33.4%)	97 (49.7%)	24 (12.3%)	9 (4.6%)	0.870 <sup>#</sup>
	4.0–<8.0	554 (63.0%)	168 (30.3%)	274 (49.5%)	87 (15.7%)	25 (4.5%)	
	≥8.0	130 (14.8%)	35 (26.9%)	69 (53.1%)	20 (15.4%)	6 (4.6%)	
Mean of daily preparation hours	<1.0	304 (34.6%)	91 (30.0%) <sup>a</sup>	170 (55.9%) <sup>a</sup>	35 (11.5%) <sup>a</sup>	8 (2.6%) <sup>a</sup>	0.023**
	1.0–<2.0	285 (32.4%)	95 (33.3%) <sup>a</sup>	134 (47.0%) <sup>a</sup>	44 (15.4%) <sup>a</sup>	12 (4.2%) <sup>a</sup>	
	≥2.0	290 (33.0%)	82 (28.3%) <sup>a</sup>	136 (46.9%) <sup>a</sup>	52 (17.9%) <sup>a</sup>	20 (6.9%) <sup>a</sup>	

<sup>#</sup>Chi square test. <sup>§</sup>Fisher's exact test. \*Significant ( $<0.05$ ). Homogenous groups had the same legend "a, b" based on post hoc Bonferroni test.

school teachers in Saudi Arabia, particularly in the Jazan region. However, few reports have been published in Tunisia Iraq and Iran (Chennoufi et al., 2012; Pishghadam, 2012; Pishghadam et al., 2014, 2022; Al-Asadi et al., 2018). That is why we included big sample of teachers with different experiences, school levels, residency, income, and both genders. Our study found that most teachers (69.6%) experienced different levels of burnout during the COVID-19 pandemic. However, nearly half

of them experienced mild (50.1%), and to lesser extent, moderate (14.9%) levels. On the other hand, only 4.6% of our participants experienced severe symptoms of burnout.

Our study showed that burnout among Saudi teachers was associated with several demographic and work-related factors. This is consistent with other studies (Maslach, 2001; Borrelli et al., 2014; Saloviita and Pakarinen, 2020). Age was related to burnout levels and specially, emotional exhaustion. Teachers



**TABLE 2 |** Consequences of burnout among teachers considering its severity.

Variables	Categories	All cases (N = 879)	Burnout				P-value
			No (N = 268)	Mild (N = 440)	Moderate (N = 131)	Severe (N = 40)	
Treated with antipsychotic (during the past 5 years)	Yes, still	10 (1.1%)	1 (10.0%) <sup>a</sup>	5 (50.0%) <sup>ab</sup>	2 (20.0%) <sup>ab</sup>	2 (20.0%) <sup>b</sup>	0.023* <sup>§</sup>
	Yes, stopped	30 (3.4%)	6 (20.0%) <sup>a</sup>	14 (46.7%) <sup>a</sup>	6 (20.0%) <sup>a</sup>	4 (13.3%) <sup>a</sup>	
	Never	839 (95.4%)	261 (31.1%) <sup>a</sup>	421 (50.2%) <sup>a</sup>	123 (14.6%) <sup>ab</sup>	34 (4.1%) <sup>b</sup>	
Absenteeism (during the COVID-19 pandemic)	None	478 (54.4%)	158 (33.1%) <sup>a</sup>	251 (52.5%) <sup>a</sup>	57 (11.9%) <sup>b</sup>	12 (2.5%) <sup>b</sup>	0.001* <sup>#</sup>
	Once	105 (11.9%)	27 (25.7%) <sup>a</sup>	54 (51.4%) <sup>a</sup>	19 (18.1%) <sup>a</sup>	5 (4.8%) <sup>a</sup>	
	Twice	103 (11.7%)	30 (29.2%) <sup>a</sup>	50 (48.5%) <sup>a</sup>	19 (18.4%) <sup>a</sup>	4 (3.9%) <sup>a</sup>	
Job satisfaction	> Twice	193 (22.0%)	53 (27.5%) <sup>a</sup>	85 (44.0%) <sup>a</sup>	36 (18.7%) <sup>ab</sup>	19 (9.8%) <sup>b</sup>	<0.001* <sup>#</sup>
	Very satisfied	490 (55.7%)	185 (37.7%) <sup>a</sup>	260 (53.1%) <sup>b</sup>	38 (7.8%) <sup>c</sup>	7 (1.4%) <sup>c</sup>	
	Satisfied	321 (36.5%)	82 (25.5%) <sup>a</sup>	152 (47.4%) <sup>a</sup>	69 (21.5%) <sup>b</sup>	18 (5.6%) <sup>ab</sup>	
Change school	Not satisfied	46 (5.2%)	1 (2.2%) <sup>a</sup>	16 (34.8%) <sup>b</sup>	19 (41.3%) <sup>c</sup>	10 (21.7%) <sup>c</sup>	<0.001* <sup>#</sup>
	Never satisfied	22 (2.5%)	0 (0.0%) <sup>a</sup>	12 (54.6%) <sup>b</sup>	5 (22.7%) <sup>c</sup>	5 (22.7%) <sup>c</sup>	
	Yes	139 (15.8%)	30 (21.6%) <sup>a</sup>	61 (43.9%) <sup>a</sup>	36 (25.9%) <sup>b</sup>	12 (8.6%) <sup>b</sup>	
	No	562 (63.9%)	186 (33.1%) <sup>a</sup>	298 (53.0%) <sup>a</sup>	63 (11.2%) <sup>b</sup>	15 (2.7%) <sup>b</sup>	<0.001* <sup>#</sup>
	May be	178 (20.3%)	52 (29.2%) <sup>a</sup>	81 (45.5%) <sup>a</sup>	32 (18.0%) <sup>a</sup>	13 (7.3%) <sup>a</sup>	

<sup>#</sup> Chi square test. <sup>§</sup> Fisher's exact test. \*Significant (<0.05). Homogenous groups had the same legend "a, b, c" based on post hoc Bonferroni test.

**TABLE 3 |** Logistic regression analysis for factors affecting burnout and its subscales.

Factors	$\beta$	SE	P	OR (95% CI)
<b>Moderate/severe burnout versus no and lower grades of burnout</b>				
Age >40 years	-0.57	0.17	0.001*	0.57 (0.40–0.80)
Residence in a village	-0.37	0.18	0.034*	0.69 (0.49–0.97)
Preparation $\geq 2.0$	0.53	0.18	0.003*	1.70 (1.20–2.41)
Constant	-1.124	0.156	<0.001*	
<b>Medium/high emotional exhaustion versus no and lower grades of exhaustion</b>				
Bachelor education	0.50	0.21	0.020	1.64 (1.08–2.49)
Teaching preparatory	0.30	0.16	0.049	1.36 (1.00–1.84)
Preparation >2 h	0.30	0.15	0.009	1.48 (1.101–1.98)
Age groups >40.0	-0.35	0.15	0.015	0.70 (0.53–0.94)
Constant	-0.12	0.23	0.598	
<b>High depersonalization versus no and lower grades of depersonalization</b>				
Teaching preparatory	0.64	0.19	0.001*	1.89 (1.31–2.73)
Preparation $\geq 2.0$	0.61	0.19	0.001*	1.85 (1.27–2.69)
Male	0.42	0.19	0.027*	1.52 (1.05–2.19)
Residence in a village	-0.69	0.19	<0.001*	0.50 (0.35–0.72)
Constant	-1.90	0.20	<0.001*	
<b>Medium/high accomplishment versus no and lower grades of accomplishment</b>				
Salary $\geq 15000.0$	0.38	0.15	0.013*	1.47 (1.08–1.98)
Constant	-0.16	0.08	0.045*	

$\beta$ , regression coefficient; SE, standard error; OR, odds ratio; CI, confidence interval. \*Significant.

aged 50 years or older were less likely to report severe forms of burnout. Logistic regression analysis showed that age was an independent predictor of self-reported burnout. The same was reported in a recent publication (Al-Asadi et al., 2018; Silva et al., 2021). In our opinion, it is logical that older age groups usually have a better teaching experience that can help them shifting from face-to-face teaching to online teaching easily and without

too much stress. We were thinking that working from home and using online technology in teaching would affect older age groups, but it did not.

The relation between gender and burnout is controversial. In some studies, burnout rates were higher among male teachers, while other studies found a higher prevalence of burnout among women (Unterbrink et al., 2007; Al-Asadi et al., 2018;

Aziz et al., 2018; Greinacher et al., 2019; Ptacek et al., 2019). In our study, being a male teacher was independently associated with higher depersonalization. However, we did not detect any gender differences in reporting burnout. This result was also reported by different other studies where burnout affects male and female teachers equally (Maslach, 2001; Deguchi et al., 2018; Castaldelli-Maia et al., 2019; Borgonovi and Han, 2021). Different studies have offered several explanations, including the role of coping skills among teachers of each gender, work expectations, and social support. We can also attribute these to cultural differences and the role of males and females in carrying out the burdens of life according to different cultures, and how this would change with a pandemic. Actually, in Saudi Arabia during the pandemic males and females were trying to help each other more and were having more time to stay home together as well.

Monthly income influenced the level of burnout experienced by participants. Teachers who were well paid felt significantly high accomplishment than underpaid teachers. This is consistent with the findings of other authors who concluded that a lack of reward is strongly related to a feeling of inefficiency (Maslach, 2001; Gan et al., 2019; Selamu et al., 2019; Li et al., 2020). This is mainly a matter of satisfaction, rather than the amount of money.

Regarding the workload, many studies have shown that workload (expressed in our study as long hours spent for preparation of materials to be delivered to the students and teaching preparatory students, who are at the beginning of the teen age and need more time to understand and do better job in studying) was closely related to burnout in the form of emotional exhaustion and depersonalization among teachers, including Saudi teachers (Santana et al., 2012; Chalhaf et al., 2019; Amri et al., 2020; Salvagioni et al., 2020; Cobo-Vazquez et al., 2021; Kalynychnenko et al., 2021; Li et al., 2021; Melanda et al., 2021; Ribeiro et al., 2021). Moreover, the notion of burnout as a response to job demands has been supported by both self-reports of experienced stress and more objective assessments of demands, such as the number of students and number of working hours (Maslach, 2001; Perry et al., 2014; Peterson et al., 2019; Hart et al., 2020; Ndongo et al., 2020; Shah et al., 2021).

Although living in cities is usually more stressful, our results showed that burnout was more likely to affect teachers living in rural areas than those in urban areas. This finding is consistent with that of a few studies conducted during the COVID-19 pandemic (Xin et al., 2020; Mueller et al., 2021; Peterson et al., 2021; Righi et al., 2021; Simaes et al., 2021). This might be because compared with the cities, internet in the villages is poor; thus, the pressure on teachers living in villages, to use online teaching is greater and may be the cause of higher burnout. Additionally, the loss of social contact during the curfew was the principal cause of burnout during this period. Moreover, usually those living in the village would have less spiritual intelligence as well (Pishghadam et al., 2022). However, these findings should be interpreted cautiously and replicated after the pandemic.

Although some factors lost their significance when combined in multivariate logistic regression, such as the use of psychotropic medications, overall satisfaction, and absenteeism, they are still risk factors of burnout among school teachers. They comprise

a network of interacting, contributing factors that substantiate each other and negatively impact teachers' quality of daily and professional life. This study suggests that serious efforts have been made to detect burnout through periodic psychological assessment, especially during the pandemic or outbreak times.

The current study is valuable as it is the first study in Saudi Arabia, particularly in the Jazan region, to use a validated scale (MBI) to measure burnout levels among teachers. Additionally, the results of this study are significant because it included a large sample of teachers (879), working at a number of different levels of schools (72), selected using multistage cluster sampling, with nearly 1:1 male to female ratio.

## Limitations

The present study had some limitations that should be considered when interpreting and generalizing its findings. The study's cross-sectional design could not explain the temporal relationship between the study variables, which is consistent with findings of other studies (Maric et al., 2020). Moreover, since the current study was conducted during the COVID-19 pandemic, and we did not have burnout data before the pandemic, our results can only be generalized to the exact situation. Some other burnout predictors were not studied in this study like the personality traits, emotional and spiritual intelligence as well as the conceptions of assessments (Pishghadam, 2012; Pishghadam et al., 2022). However, as the population in Jazan area are homogenous and the evaluation of the teachers is following the same rules, these factors would have no effect on burnout in this area but should be considered in further researches.

## Future Research

Other burnout predictors should be studied including the personality traits, emotional and spiritual intelligence as well as the conceptions of assessments. Moreover, intervention studies should be conducted to find out the best methods to alleviate the burnout among teachers.

## CONCLUSION

Although burnout affected most of the teachers but its severity was mild to moderate. However, teachers living rural area, with less facilities, expressed more burnout during the pandemic. In Saudi Arabia, men and women are equally affected by burnout. It is recommended to increase teacher salaries and incentives, especially during stressful conditions, such as during a pandemic. It is good to repeat this work, especially after the pandemic, taking into consideration studying the personality traits, emotional and spiritual intelligence to have better information that would help in alleviating burnout symptoms among teachers.

## DATA AVAILABILITY STATEMENT

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Jazan University Scientific Research Ethics Committee. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MS, AAA, MA, AD, ZM, AW, and MM contributed to the data and references collection, and helped in writing the first draft and tables. 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.2022.849328/full#supplementary-material>

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# Reduced Anxiety Associated to Adaptive and Mindful Coping Strategies in General Practitioners Compared With Hospital Nurses in Response to COVID-19 Pandemic Primary Care Reorganization

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COVID-19 pandemic imposed psychosocial stress increasing in frontline healthcare workers, who managed by responding with different coping strategies. General practitioners were targeted by an extraordinary increase in the demand for reception, diagnosis and treatment from all patients even if working in solo. In Italy, the emergency changed risk assumption and roles in between primary care, unraveling the emotional distress of general practitioners, who suffered not only for isolation, but also emotional threatens. In this correlational study we wanted to evaluate trait anxiety and stress as perceived by general practitioners working in individual ambulatory practice room, and by hospital ward nurses working in group, during a chronic phase (February–May 2021) of COVID-19 pandemic. Our hypothesis is that a different work social organization in clinic contest as for general practitioners compared with nurses could induce adaptive or non-adaptive coping to stress under emergency and mindful attitude could be crucial. A number of 37 general practitioners, and 36 nurses were taken from the sanitary district of ASL1 Avezzano-Sulmona-L'Aquila in Italy. For our analyses we used the Health Professions Stress and Coping Scale to assess the risk of burn-out, and detect the coping strategies. We also used the Cognitive and Affective Mindfulness Scale-Revised, investigating whether clinicians used an eventual mindful attitude to prevent anxiety and responding with adaptive coping strategies. General practitioners reported high levels of anxiety, associated to an increased use of emotional distress. Mindful attitude was protective for anxiety in both general practitioners and nurses. As anxiety increased, it was coped by increasing the demand for social support. This coping strategy correlated with emotional distress and when enhanced, it corresponded to avoidance of the problem. Mindful attitude addressed general practitioners to adaptive coping strategies as the solution of the problem. On the other side, nurses accepted

the problem but addressed it to others, by avoiding solving it themselves as beyond their role and organizational responsibility. In conclusion, mindful attitude can prevent dysfunctional reactive behaviors among clinicians at the forefront of emergency and reduce emotional distress for isolation as suffered by general practitioners.

**Keywords:** anxiety, mindful, coping strategies, general practitioners, hospital nurses, COVID-19

## INTRODUCTION

The COVID-19 pandemic has imposed unprecedented challenges on healthcare systems globally. Governments around the world declaring sanitary emergency sudden introduced safety procedures such as quarantine and social distancing, with impacts on the mental health and psychosocial wellbeing of healthcare workers (Babore et al., 2020; Zhang et al., 2020). While it has been demonstrated that healthcare workers have higher resilience scores than general population (West et al., 2020), they face unique workplace demands and are at increased risk of depression, burnout and suicide during daily life outside of crises (Shanafelt et al., 2012; Milner et al., 2016). During the COVID-19 pandemic, frontline healthcare workers have reported even higher levels of anxiety, depression, and post-traumatic stress disorder (Smallwood et al., 2021a). They managed and responded to the psychosocial stress of the pandemic by using different types of coping strategies, which resulted in some cases as adaptive and in others not (Smallwood et al., 2021b). At practice level, during the pandemic all the primary care has altered dramatically, with staff—clinical and administrative—adapting to new socially distanced ways of working for the high risk of infection. Roles and responsibilities of clinicians had to be quickly reorganized on the basis of government decrees for the ongoing health emergency. However, studies have not addressed differences in risk assumption and roles in between primary care, focusing more on frontline nurses and on medical doctors of hospital wards treating COVID-19 symptomatic or severe patients, but less on general practitioners (GPs), who were targeted by an extraordinary and exponential increase in the demand for reception, diagnosis and treatment from all symptomatic and asymptomatic patients, thus exposed to the same frontline risk and demand as ward nurses (Li and Zhu, 2020).

GPs in China as in other countries were at the forefront of tackling the spread of the virus. In general GPs make up 80% of primary care (private or public community) services in most healthcare systems and are prominently at the front-line. They were the first touchpoint of cases presenting with early upper respiratory tract infection symptoms (Low et al., 2021). They received patients providing medical treatment accordingly, as well as conduct surveillance testing of COVID-19. When a COVID-19 positive case was detected, GPs contacted the relevant agencies to transport the patient to an identified isolation facility for further treatment and management. In Italy, GPs is a freelancer affiliated with the national health system. GPs in Italy are also called “family doctors” as they usually accept and follow up patients from the same neighborhood, village or urban area. Most of them are old acquaintances having long taken care of all the members of a family, therefore working and living in great

confidence with citizens. Under pandemic the Italian national health system ordered GPs for the therapeutic follow-up of all their patients infected with COVID-19 or symptomatic, whether hospitalized at home, discharged from hospitals or asymptomatic and non-hospitalized. Meanwhile the Italian government and health system informed the citizens not to go directly to the hospitals but first to call the COVID-19 centers or their family doctor for a visit or just for general information. Then GPs suffered not only from an increase in the demand for help, but also for all fears and anxieties of their long time patients. GPs as “family doctors” were the first container of physical and psychological distress of COVID-19 in their often small ambulatory practice room and without having the same spaces, diagnostic tools, assistance and organized group to cope as in hospitals. In comparison to the ward clinicians and nurses at the forefront with pandemic patients, Italian GPs felt left alone in front of patients and reported it several times to journalists and in the Italian Federation of General Practitioners (FIMMG), with several interview articles published on 2020 national newspapers. The mental state of GPs in response to an infectious disease outbreak, especially to one on such a massive scale as the COVID-19 pandemic, is of great concern. There is a consensus in studies examining the wellbeing of doctors during COVID-19 that doctors are at higher risk of suffering from an acute stress reaction, burnout, insomnia, anxiety, depression, and post-traumatic stress disorder, compared to the general population. These have long-term psychological implications (Raudenská et al., 2020; Spoorthy et al., 2020).

Based on Lazarus and Folkman (1984), coping could be defined as the behavioral and cognitive efforts that people use to manage the internal and external demands due to a stressful situation. Although there are many specific coping strategies, researchers have typically conceptualized coping using one of the following two superordinate distinctions: on the one hand (a) problem-focused (addressing external demands of stressors) vs. emotion-focused (addressing internal demands of stressors); on the other hand (b) approach (acting on the demands of a stressor) vs. avoidance (avoiding or disengaging from the demands of a stressor (Suls and Fletcher, 1985).

We have reviewed the stress assessments of clinicians, taking into account also the perspective of the Lazarus and Folkman's model. Online surveys were conducted to explore the psychological stress status and psychological care needs of the healthcare workers during the COVID-19 outbreak period (Smallwood et al., 2021b); we particularly focused on results from surveys in Europe (Hummel et al., 2021) and Italy (Conti et al., 2020). A considerable proportion of participants showed high values for depression, anxiety, and stress. Even though medical professionals exhibited less mental stress than non-medical

professionals, both doctors' and nurses' shared common coping strategies to deal with this unusual situation, as "taking protective measures" and "actively acquiring more knowledge about COVID-19," but these strategies were not sufficient to reduce the observed mental disease. Another important strategy was "video-chatting with family and friends to share concerns and support," which had high priority for participants. This has the advantage to get in touch directly with people experiencing mental burden, with the help of so-called e-mental health applications. Were observed, the increasing of request for a kind of psycho-social support seemed to be more effective in reducing stress and anxiety. Healthcare workers who perceived the need for psychological support scored above the clinical alarming level in psychological scales. Results from these surveys point out the importance to consider the psychological impact of COVID-19 on Italian health-care workers and strongly suggest providing adequate professional care, training and prevention of post traumatic stress and mental disease, for which there are still no data results for the medium and long term of COVID-19 pandemic.

Few studies have focused on the coping strategies of GPs during the COVID-19 crisis, suggesting that different strategies could be necessary at different phases in the coping of GPs. One study reported that task-oriented management was preferred by GPs (Di Monte et al., 2020), another found a balance of individual and organization strategies, including psychological intervention or support programs that could be useful in mitigating the psychological impact of crisis (Heath et al., 2020). Elsewhere, GPs' distress and adaptation to crisis was analyzed respect to resilience and emotional response (Seçer et al., 2020; Low et al., 2021), concluding that the positive mentality of the doctors could be considered as a major adaptive coping strategy in the broader context of the prevailing management of the pandemic in the local setting, with a supportive environment and a sense of security and trust as probably the effective management of crisis by the local authorities contributing to positive mental health in the GPs at the frontline. These indications are in line with results of a survey on Italian general population (Tintori et al., 2020), indicating that two coping indicators—problem-oriented and focused on positive emotions coping strategies—were selected as objective variables in a "decision tree" modeling, showing a link between individual factors (i.e., atmosphere at home) and educational and social factors (i.e., compliance with restrictions during the health emergency).

In this correlational study we investigated Italian GPs and hospital COVID-departments nurses anxiety, stress and coping even related to mindfulness and emotion regulation under pandemic, in order to highlight if there are differences induced by role and responsibility in frontline healthcare as first contact point of patients and eventually as following reorganization of primary healthcare under emergency. By using the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R) (Feldman et al., 2006), we investigated whether mindful attitude or training were important strategies as personal resource or psychosocial intervention to prevent anxiety and deal with patients at the first touchpoint under COVID-19 pandemic. Mindfulness indicates an attitude and state of mind connected with attention and

awareness useful to cope with stress. Many studies highlighted positive correlations between high mindfulness disposition and psychological well-being, and there is evidence for mindfulness training as an efficient method of distress reduction in medical and psychiatric populations, as well as in non-clinical populations (Baer, 2003; Grossman et al., 2004), were self-report measure of mindfulness is a method to define the coping strategies included in this construct (Dimidjian and Linehan, 2003; Bishop et al., 2004). Mindfulness-based cognitive therapy and stress reduction improve mental health and wellbeing by modulating cognitive and emotional reactivity to stressors, with rumination and worry as significant mediators of mental health outcomes (Gu et al., 2015), and training mindfulness abilities may contribute to making effective coping strategies in clinical and psychological conditions (Chi et al., 2018; Hernando et al., 2019; Perilli et al., 2020). A recent important study investigated the influence of mindfulness training on mental health during the COVID-19 outbreak in China (Zhu et al., 2021), finding lower scores of pandemic-related distress in mindfulness practitioners compared to non-practitioners. Health care professionals report higher levels of mental distress and lower levels of life satisfaction than general population, and they are likely to continue reporting high levels of stress, burnout and suicide in situations of crisis (de Vibe et al., 2018). Mindfulness can have an important impact on healthcare professionals, improving their performance (Scheepers et al., 2020), wellbeing and mental health (Lomas et al., 2018), and promoting coping strategies that reduce stress (Burton et al., 2017). Qualitative findings related positive effects to specific mindfulness elements: self-awareness of stress and self-regulation of behaviors facilitated self-care of wellbeing (Verweij et al., 2016). When working in group, were doctors are used to share experience and promote peer support, mindfulness also appeared beneficial for wellbeing (Beckman et al., 2012; Verweij et al., 2016). In a previous study, GPs noticed that sharing experiences with peers helped them to deal with stressful events, by providing reassurance that they were not alone in their feelings (Beckman et al., 2012). This was particularly relevant to GPs working in solo practices, as usual in Italy and compared with ward nurses, working instead in group and with different frontline responsibilities compared to doctors with respect to patients. GPs reported that participation in a mindful-based intervention reduced their sense of professional isolation (Beckman et al., 2012). Our study evaluated the self-report measures of mindfulness compared with anxiety, stress and coping strategies of a representative sample of Italian GPs and nurses from L'Aquila city's sanitary district. Questionnaires administration was undertaken during pandemic after the second wave of COVID-19 on spring 2021. L'Aquila city was already hit in the past by a sanitary emergency after the 2009 earthquake with 309 dead, 1,600 injured and approximately 80,000 displaced, with partial destruction of the city. The choice of this sample was also made to have a representation of the most significant moment in reorganized work responsibility for Italian GPs and hospital ward nurses with already a consolidated experience of extraordinary working conditions and traumatic stress due to a general emergency, and responses of this sensitive population were evaluated under pandemic.

## MATERIALS AND METHODS

### Subjects

The research involved a total of 73 voluntary subjects aged between 23 and 69 years (see **Supplementary Tables 1, 2** for a descriptive analysis of the sample). These subjects were taken from the sanitary district of ASL1 Avezzano-Sulmona-L'Aquila, in central Italy, as representative of a specific territorial context where the work organization of clinicians was rapidly reprogrammed for the emergency due to COVID-19 pandemic. GPs worked isolated in private ambulatories affiliated with the ASL1; nurses worked in specific and recently reorganized COVID-19 forefront hospital wards (Pulmonology, COVID-Medicine, Infectious diseases and Intensive care units). The number of voluntary subjects was 50% of total GPs and nurses working at that time in the district (88 GPs and 60 nurses); this allowed us to consider the recruited sample as representative not on the basis of specific control factors, but of that specific historical moment and territory in which the working reorganization due to COVID-19 occurred. Sample characteristics are provided in **Table 1**. The GPs sample consisted of 37 subjects aged between 27 and 69 years. The average seniority of GPs was 31.95 years of work activity (St Dev = 9.891), with a mean of 34.65 h per week (St Dev = 13.89). The nurse sample consisted of 36 subjects aged between 23 and 55 years. The average seniority of nurses was 6.39 years of work activity (St Dev = 8.23), with a mean of 36.17 h per week (St Dev = 0.85).

### Procedures

During the period from February to May 2021, GPs and nurses subjects completed a set of two self-report questionnaires under supervision. GPs were contacted telephonically to offer them to participate in this research, and then to arrange an appointment to personally administer the questionnaires in their private ambulatory. We obtained GPs contacts from the ASL1 database. In order to recruit nurses (personal contacts were not provided by ASL1), we contacted the primary and the head nurse of the respective hospital departments, which provided to contact the nurses. A psychologist from our group who already worked within those departments took care of personally administer and collecting the questionnaires from nurses at the ward. All the subjects were equally instructed to compile the questionnaires by using a standard Instructions form.

### Psychological Evaluation

Subjects were asked to compile the Cognitive and Affective Mindfulness Scale- Revised (CAMS-R), a questionnaire created by Feldman et al. (2006) to measure mindfulness as mindful attitude in stressful situations. The authors conceptualized mindfulness in a set of four attitude dimensions: attention, focus, acceptance and awareness. The CAMS-R questionnaire consists of 12 items, where the subject evaluates on a Likert scale ranging from 1 ("rarely/not at all") to 4 ("almost always") how much the statement is in accordance with their attitude. We administered the Italian adaptation of the CAMS-R (Veneziani and Voci, 2015).

Subjects were also asked to compile the Health Professions Stress and Coping Scale (HPSCS), a questionnaire for the evaluation of stress perceived in specific situations of healthcare professions and the use of coping strategies to reduce the stress (Spielberger et al., 1970). It proposes several potentially stressful work situations, and measures both the level of perceived stress as emotional exhaustion, depersonalization and personal fulfillment, and coping mechanisms used to cope with it. The HPSCS allows the assessment, for the individual or for an entire ward, of situations in which work efficiency is threatened and the risk of burn-out is looming, allowing to plan preventive and intervention focused strategies. In our case it was useful for detecting the experiences perceived as the most stressful and the strategies adopted to cope with them. It exists in two versions: one for doctors and one for nurses. The version for doctors consists of 23 items (situations) that refer to 5 areas, for a total of 115 statements. The areas are: personal attack and organizational contingencies, clinical emergency, confrontation with death, problematic relationships with patients, personal devaluation. The version for nurses consists of 19 items (situations) that refer to 5 areas, for a total of 95 statements. The areas are: clinical emergency, personal attack, organizational contingencies, personal devaluation, problematic relationships with patients and family members. Both versions can be used to measure perceived stress and coping strategies related to the totality of situations (Total Stress and General Coping Strategies), both to measure perceived stress and coping strategies in each of the five areas. Based on Lazarus and Folkman's model (Lazarus and Folkman, 1984), HPSCS conceptualized coping by distinguishing 4 mechanisms of orientation: centered on the Solution of the problem (the most suitable solutions are sought with extensive use of technical knowledge), centered

**TABLE 1 |** Frequencies of responses (number of GPs and nurses subjects) and scoring to HPSCS questionnaire as divided for coping strategy.

	T scores	Solution of the problem		Request for social support		Emotional distress		Avoidance of the problem	
		GPs	Nurses	GPs	Nurses	GPs	Nurses	GPs	Nurses
Rarely/not at all	$T < 35$	5	1	10	1	1	4	2	0
Little	$35 \leq T < 45$	9	4	10	5	9	13	11	9
On average	$45 \leq T < 55$	11	18	14	11	11	13	15	10
Often	$55 \leq T < 65$	11	9	3	14	14	3	8	5
Very frequently	$T \geq 65$	1	4	0	5	2	3	1	12
N total		37	36	37	36	37	36	37	36



on the Request for social support (seeking for advice and help of other people), centered on Emotional distress (reacting on an emotional level and unable to properly manage and control emotions), or centered on Avoidance of the problem (attempting to avoid the problematic situation on a cognitive or behavioral level).

To understand the effects of mindful attitude on reaction to anxiety and consequent coping strategies, we administered the State-Trait Anxiety Inventory in the form X2 (STAI-X2) assessing the trait emotion, or relatively stable individual characteristics as regarding predisposition to anxiety (Spielberger et al., 1970, 1980). Particularly, trait anxiety indicates that tendency to perceive situations which are even objectively not dangerous as threatening, responding to them with an anxiety that is disproportionate to the severity of the danger. The test consists of 20 questions for each of which there are 4 possible answers, with the relative scores on a Likert scale ranging from 4 ("almost always") to 1 point ("almost never"). For some responses, the scores must be reversed as the questions refer to the absence of anxiety.

## Data Analysis

The CAMS-R and STAI-X2 questionnaires were entered directly into Excel tables for cleaning and scoring, instead the HPSCS data were entered in insertion tables on the Giunti editor's website, as requested by the publisher, necessary for restitution of standard protocol.

According to the CAMS-R questionnaire manual (Feldman et al., 2006; Veneziani and Voci, 2015), there are some negative items that require to be reversed before proceeding with the statistical analysis: the scoring of items 2, 6, and 7 have therefore been converted ( $1 = 4$ ;  $2 = 3$ ;  $3 = 2$ ;  $4 = 1$ ). Descriptive statistics were carried out calculating the sum for each subject, and the mean. The reliability analysis of the questionnaire was carried out by means of SPSS software and applying Cronbach's alpha index. This gave a result of  $\geq 0.6$  making the questionnaire reliable. As authors of the CAMS-R, Feldman et al. (2006) provided 4 factors resulting from the questionnaire factor analysis: Attention (items 1, 6, 12), Focus (items 2, 7, 11), Awareness (items 5, 8, 9), and Acceptance (items 3, 4, 10). By means of SPSS, clusters were created to isolate these factors through the calculation of variables.

About the HPSCS questionnaires, after entering the data obtained from the reports in SPSS, the properties of these questionnaires allowed us to move quite freely in the organization of data analysis. First of all, a reliability analysis (Cronbach's alpha) was calculated with respect to the areas proposed by the questionnaire. Unfortunately it turned out to be  $\leq 0.6$  and consequently not reliable. Reliability (Cronbach's alpha) was then assessed taking into account the different coping strategies. In fact, each situation presented 4 alternatives, equivalent to the 4 coping strategies originally identified by Lazarus and Folkman (1984), on the basis of the theoretical criteria of the questionnaire: Solution of the problem, Request for social support, Emotional distress, and Avoidance of the problem. As demonstrated by internal consistency and item total correlation coefficients relating to the coping strategies present in the

HPSCS editor's manual (Ripamonti et al., 2008) Cronbach's alpha resulted  $\geq 0.6$ .

The STAI-X2 trait anxiety questionnaire presented negative questions to be reversed as above mentioned for the CAMS-R. The analysis was carried out according to the normative tables of the editor's manual (Sanavio et al., 1998), by calculating sums and averages of Z scores, even through the calculation of the  $ds\ Z = (\text{raw-average score})/ds$ . The reliability analysis of the questionnaire was carried out with SPSS, applying Cronbach's alpha, resulting in  $\geq 0.6$  making the questionnaire reliable.

Correlations were assessed (bivariate Pearson's correlation) by means of SPSS software and taking into account all three questionnaire tests. For HPSCS, reliable results were directly taken as calculated for the 4 coping strategies). Subsequently, specific correlations were calculated between the factors of CAMS-R and the coping strategies of the HPSCS.

## RESULTS

### Instruments Reliability Criteria

HPSCS reliability (Cronbach's alpha) was assessed for all the four coping strategies: Solution of the problem (0.814), Request for social support (0.898), Emotional distress (0.855), and Avoidance of the problem (0.778). CAMS-R reliability (Cronbach's alpha) was also assessed upon the sum of all coping strategies (0.724). STAI-X2 reliability (Cronbach's alpha) was also calculated in a test-retest correlation with a range from 0.73 to 0.86, while the internal consistency index varying in the range between 0.86 and 0.92 (Cronbach's alpha).

### Comparative Analysis

Reference values of anxiety as measured by means of STAI-X2 scale were taken from CBA 2.0 battery test (Sanavio et al., 1998), depending on the sex and age of the subjects. As obtained from this analysis, the 75.7% of GPs had normal anxiety as average levels, 13.5% had low and 10.8% had high anxiety levels, indicating a not critical impact of the stress on trait anxiety at this point of the pandemic. Compared with GPs, a relevant quote of nurses had lower levels of anxiety since 50% of nurses had low levels of anxiety, and 47.22% had normal but only 2.78% had high levels of anxiety. Taken together, although not demonstrating an acute phase for GPs, these results show that a greater number of them incorporated anxious traits and attitudes related to stress, probably due to the different role and organizational context of isolation in which they had to work in recent times of pandemic.

**Table 1** shows results of GPs and nurses at the HPSCS questionnaire. Solution of the problem, Request for social support, Emotional distress, and Avoidance of the problem were the four coping strategies considered from the test. This analysis points out to the tendency for using the "Emotional distress" strategy with higher frequency in GPs, but difference was not significant as this strategy aligned with the norm (mean T scores = 50, StDev = 10). At difference, nurses had the tendency for using the "Avoidance of the problem" and the "Request for social support" strategies with significantly higher frequencies, and "Emotional distress" with significantly lower frequency.



Compared with GPs, these results suggest a different pattern of coping in clinical practice between GPs and nurses.

HPSCS test resulted also in a quantification of the level of stress perceived. This analysis suggests that GPs were moderately stressed (32,43% of subjects on average stress levels), with a similar number of subjects with low (16,22%), very low (18,92%) or high (18,92%), and very high (13,51%) stress. Compared with GPs, stress levels measured from HPSCS test in nurses were lower, with only 5.56% of nurses with high and 2.78% with very high levels, and most of nurses on average (36,11%), low (30,55%) or very low (25%) levels of stress. No substantial difference in responses between subject sex or age allowed to make further assumptions (data not shown), suggesting for a more detailed comparative analysis to be performed.

**Table 2** shows results of an independent sample Levene's test and Student's *t*-test for comparison between variances and means of CAMS-R test scores of GPs in the different four factors as coping strategies of mindfulness: Attention, Focus, Awareness and Acceptance. Mean comparisons were not significant as showing no difference between the four different CAMS-R coping strategies and the mean of all CAMS-R scores was 3.08 with a StDev of 0.39. This legitimated us to compare each different CAMS-R factor to HPSCS test's coping strategies and STAI-X2 anxiety as subscales.

**Table 3** shows results of an independent sample Levene's test and Student's *t*-test for comparison between variances and means of CAMS-R test scores of nurses in the different four factors as coping strategies of mindfulness: Attention, Focus, Awareness and Acceptance. Mean comparisons were not significant as showing no difference between the four different CAMS-R coping strategies and the mean of all CAMS-R scores was 3.12 with a StDev of 0.42. This legitimated us to compare each different CAMS-R factor to HPSCS test's coping strategies and STAI-X2 anxiety as subscales.

## Correlational Analysis

Analysis of correlation between trait anxiety and mindful attitude in GPs, represented in **Table 4**, demonstrated a negative correlation between anxiety and mindfulness as measured, respectively, by means of STAI-X2 and CAMS-R tests ( $p$ , 0.01 at a bilateral level). This indicates that predisposition of mindful positive strategies has lowered anxiety in GPs. Interestingly, anxiety was positively correlated with coping strategies as measured by means of the HPSCS test, in particular with Request for social support ( $p$ , 0.05 at a bilateral level), suggesting that GPs may have suffered stress for isolation when activating for requesting more social support. Emotional distress was not correlated to anxiety, but positively correlated to Request for social support and to Avoidance of the problem ( $p$ , 0.01 at a bilateral level), indicating a complementary activation of negative coping strategies to stress and negative emotions. Request for social support also positively correlated with Avoidance of the problem ( $p$ , 0.05 at a bilateral level). Conversely, mindful attitude positively correlated with Solution of the problem ( $p$ , 0.05 at a bilateral level), indicating that those mindful GPs activated a positive coping strategy to address the problem for its solution.

By confronting the GPs' mindful coping strategies measured by means of the CAMS-R test factors with positive or negative coping strategies as measured by means of the HPSCS test (**Table 5**), we found a negative correlation between Focus and not conclusive coping strategies as Request for social support and Avoidance of the problem ( $p$ , 0.05 at a bilateral level), indicating that personal mindful predisposition of GPs activated Focus strategy to cope to stress instead of requesting for social support and trying to avoid the problem. At same time, we found a positive correlation between Attention and positive coping strategy as Solution of the problem, confirming that mindful GPs activated resolute coping.

**Tables 6, 7** show results of the same correlation analyses on nurses. Similarly to GPs (**Table 4**), correlation between trait anxiety and mindful attitude in nurses represented in **Table 1** demonstrated a negative correlation between anxiety and mindfulness as measured, respectively, by means of STAI-X2 and CAMS-R tests ( $p$ , 0.01 at a bilateral level). This indicates that predisposition of mindful positive strategies has lowered anxiety also in nurses. Anxiety was strongly positively correlated with Request for social support ( $p$ , 0.01 at a bilateral level), but since levels of anxiety and stress were lower in nurses than in GPs as showed before, we suggest that nurses activated for requesting social support from doctors or other ward nurses as normally they do to cope with problematic situations. On the other hand, emotional distress was not correlated to anxiety, but positively correlated to Request for social support and to Avoidance of the problem ( $p$ , 0.01 and  $p$ , 0.05, respectively, at a bilateral level), indicating a complementary activation of negative coping strategies to stress and negative emotions similarly to GPs (**Table 4**). Interestingly, mindful attitude in nurses activated coping strategy different from GPs, as positively correlating with Avoidance of the problem ( $p$ , 0.01 at a bilateral level), indicating that those mindful nurses activated a coping strategy to not personally address the problem.

Moreover, Avoidance of the problem in nurses was positively correlated with mindful coping strategies of Awareness ( $p$ , 0.01 at a bilateral level) and Acceptance ( $p$ , 0.05 at a bilateral level), confirming that nurses activated a different, not resolute but even mindful, pattern of coping (**Table 7**).

## DISCUSSION

In this study we wanted to evaluate anxiety and stress as perceived by GPs working alone in ambulatory practice room and by hospital ward nurses during a chronic phase of COVID-19 pandemic sanitary emergency (February–May 2021). Subjects were taken from the suburban area of a small Italian town, L'Aquila, where citizens and health professionals were already sensitive to sanitary emergency with great psychosocial effects as for the recent earthquake on 2009. Subjects could have eventual post-traumatic stress long-term effects, but even formed experience of coping in a situation of extraordinary work reorganization and with measures to contain distress. The choice of this sample was made in order to highlight the possible effects of traumatic stress on coping strategies aimed at solving

**TABLE 2 |** Analysis of variance between the means of CAMS-R test scores of GPs in the single test (CAMS) and in the four factors (attention, focus, awareness, acceptance) by means of Levene's test and student's *t*-test for independent samples (upper row assumed equal variances, lower row not assumed equal variances).

	Mean	StDev	Mean St. Error	Levene's test for the equality of variances		t-test for the equality of means					
				F	Sign.	Confidence interval of difference 95%					
						t	df	Sign.	Mean dif.	Inferior	Superior
Acceptance	2.963	0.562	0.093	0.662	0.421	−0.25	35	0.804	0.04969	−0.4535	0.3542
						−0.259	30.918	0.797	−0.04969	−0.4402	0.3409
Awareness	2.888	0.596	0.099	1.471	0.233	0.244	35	0.809	0.05176	−0.379	0.4825
						0.223	20.489	0.826	0.05176	−0.4323	0.5358
Focus	3.129	0.565	0.094	1.489	0.231	1.205	35	0.236	0.19462	−0.1331	0.5224
						1.137	22.758	0.268	0.19462	−0.1598	0.549
Attention	3.49	0.454	0.075	0.411	0.526	−0.162	35	0.872	−0.02899	−0.3923	0.3343
						−0.171	32.301	0.865	−0.02899	−0.3737	0.3157

**TABLE 3 |** Analysis of variance between the means of CAMS-R test scores of nurses in the single test (CAMS) and in the four factors (attention, focus, awareness, acceptance) by means of Levene's test and student's *t*-test for independent samples (upper row assumed equal variances, lower row not assumed equal variances).

	Mean	StDev	Mean St. Error	Levene's test for the equality of variances		t-test for the equality of means					
				F	Sign.	Confidence interval of difference 95%					
						t	df	Sign.	Mean dif.	Inferior	Superior
Acceptance	2.963	0.562	0.093	0.186	0.669	−0.075	34	0.941	0.18181	−0.383	0.3559
						−0.085	10.861	0.934	0.15996	−0.3661	0.339
Awareness	2.888	0.596	0.099	0.803	0.376	0.212	34	0.834	0.19392	−0.353	0.4351
						0.187	8.054	0.856	0.21977	−0.4651	0.5472
Focus	3.129	0.565	0.094	0.044	0.835	1.325	34	0.194	0.2354	−0.1664	0.7903
						1.27	8.71	0.237	0.24574	−0.2467	0.8707
Attention	3.49	0.454	0.075	1.28	0.266	−0.301	34	0.765	0.23988	−0.5597	0.4152
						−0.402	14.83	0.693	0.17951	−0.4552	0.3107

**TABLE 4 |** Correlations between trait anxiety and mindful attitude in GPs, calculated as bivariate Pearson's correlation of the sum of, respectively, of STAY-X2 and CAMS-R scores, and with the sum of each HPSCS coping strategy scores.

		HPSCS coping strategies					
		STAY-X2	CAMS-R	Solution of the problem	Request for social support	Emotional distress	Avoidance of the problem
HPSCS coping strategies	STAY-X2	1	−0.514**	−0.063	0.380*	0.282	0.242
	CAMS-R	−0.514**	1	0.366*	−0.032	0.086	−0.044
	Solution of the problem	−0.063	0.366*	1	0.233	0.079	−0.214
	Request for social support	0.380*	−0.032	0.233	1	0.640**	0.400*
	Emotional distress	0.282	0.086	0.079	0.640**	1	0.468**
	Avoidance the problem	0.242	−0.044	−0.214	0.400*	0.468**	1

\*\*Correlation is significant at the 0.01 level (2-tailed). \*Correlation is significant at the 0.05 level (2-tailed).

problems due to the professional role, not only for the risk of being at the first touchpoint with the patients, but also to the actual reorganization that these have undergone as imposed by pandemic from national health system. Since GPs work individually, and nurses work in teams, the configuration of the sample groups could almost partially account for the

differences found in results, beyond mindfulness practices and anxiety levels. Recent studies showed that healthcare workers directly involved with COVID-19 patients and from areas with higher rates of contagion reported higher levels in perceived stress, anxiety, depression, burnout, and secondary trauma levels than their colleagues working with non-COVID-19 patients

**TABLE 5 |** Correlations of mindful attitude (CAMS-R) and mindful coping strategies (awareness, acceptance, focus, attention) with HPSCS coping strategies in GPs, calculated as bivariate Pearson's correlation of the sum of, respectively, of CAMS-R and each factors' scores with the sum of each HPSCS coping strategy scores.

		HPSCS coping strategies			
		Solution of the problem	Request for social support	Emotional distress	Avoidance of the problem
CAMS-R factors	Awareness	0.304	0.228	0.285	0.147
	Acceptance	0.234	0.072	0.108	0.18
	Focus	0.077	−0.409*	−0.298	−0.361*
	Attention	0.421**	−0.071	0.078	−0.178

\*\*Correlation is significant at the 0.01 level (2-tailed). \*Correlation is significant at the 0.05 level (2-tailed).

(Trumello et al., 2020; Buselli et al., 2020; Dobson et al., 2021). In this context, organizational support systems can be an invaluable buffer against burnout and increase employee perceptions of their own health, for example the presence of coworker support aided in reducing perceptions of disengagement in team nurses (Finuf et al., 2021). When team members felt they had support from both their coworkers and supervisor, disengagement was significantly reduced compared to coworker support alone; moreover the lower emotional exhaustion translated to increased perceptions of both physical and psychological health. Burnout is negatively correlated with perceived organizational support and coworker social support in nurses (Lowe et al., 2020). Therefore we can imagine that GPs, working alone and without working support conditions, have been more severely exposed to the consequences of pandemic.

Our analyses showed that GPs were generally not in burden for stress and anxiety on that phase of emergency, but comparisons to nurses showed a higher number of GPs with high levels of anxiety and stress, and higher tendency to use emotional distress as coping strategy. These tendencies could be confirmed as significant if using a larger study sample. Therefore, coping strategies provide information to determine changes to intermediate or low levels of stress and anxiety. Comparisons

with mindfulness coping strategies allowed to understand the effects of each coping strategy on reducing stress and anxiety at this chronic phase. We found that anxiety induced by a threatening and traumatic adaptive situation such as pandemic was significantly reduced in both GPs and nurses with mindful attitude, with mindfulness as protective for anxiety. As anxiety increased both in GPs and nurses, this was coped by increasing the demand for social support. This coping strategy correlated with emotional distress and when enhanced, emotional distress corresponded to the avoidance of the problem. Since social support positively correlated with avoidance of the problem, we suggest that GPs may have engaged in seeking social support, for example with colleagues from hospital departments, in order to avoid the problem of the patients instead of addressing it. Both GPs and nurses coping strategies suggest that when present, a mindful attitude triggered analogous responses to anxiety and stress, but addressed to different targets into the organizational care context and on the basis of the role and skills of the investigated health personnel. We can suggest that nurses were accustomed to entrusting the problem to a doctor or to delegating the competent staff of the ward. This difference in mindful attitude of nurses can be traced back in the current primary care situation to the different role and working environment compared to the GP.

To better understand how mindful attitude determined the coping responses of GPs as compared with nurses, we must refer to the extraordinary changes that pandemic induced in the different organizational contexts of GPs compared to hospital ward nurses. A recent national survey studied between May and June 2021 the changes in professional role and relations of GPs toward citizens as induced by pandemic (Quotidianosanita, 2021). Some statistics from this survey are relevant to understand the psychosocial background of our sample: 55.8% of citizen sample reported that “personal GPs is special and would not want to change it,” more than 50% having a relationship with the GP longer than 10 years, 22.6% longer than 20 years, with generally high satisfaction for availability (78.9%) and contactability (75.1%) of personal GP, these confirming the long-time personal relationship that patients have with own GP. In case of need for a medical consultation, 77.4% of citizens contact primarily the personal GP, confirming the priority of GPs at the

**TABLE 6 |** Correlations between trait anxiety and mindful attitude in nurses, calculated as bivariate Pearson's correlation of the sum of, respectively, of STAY-X2 and CAMS-R scores, and with the sum of each HPSCS coping strategy scores.

		HPSCS coping strategies					
		STAY-X2	CAMS-R	Solution of the problem	Request for social support	Emotional distress	Avoidance of the problem
HPSCS coping strategies	STAY-X2	1	−0.641**	−0.138	0.556**	0.321	0.026
	CAMS-R	−0.641**	1	0.216	−0.094	0.081	0.442**
	Solution of the problem	−0.138	0.216	1	0.072	−0.249	−0.126
	Request for social support	0.556**	−0.094	0.072	1	0.518**	0.305
	Emotional distress	0.321	0.081	−0.249	0.518**	1	0.351*
	Avoidance the problem	0.026	0.442**	−0.126	0.305	0.351*	1

\*\*Correlation is significant at the 0.01 level (2-tailed). \*Correlation is significant at the 0.05 level (2-tailed).

**TABLE 7 |** Correlations of mindful attitude (CAMS-R) and mindful coping strategies (Awareness, Acceptance, Focus, Attention) with HPSCS coping strategies in nurses, calculated as bivariate Pearson's correlation of the sum of, respectively, of CAMS-R and each factors' scores with the sum of each HPSCS coping strategy scores.

		HPSCS coping strategies			
		Solution of the problem	Request for social support	Emotional distress	Avoidance of the problem
CAMS-R factors	Awareness	0.326	−0.032	0.164	0.510**
	Acceptance	0.088	0.092	0.177	0.400*
	Focus	0.071	−0.326	−0.091	0.132
	Attention	0.183	−0.018	−0.016	0.326

\*\*Correlation is significant at the 0.01 level (2-tailed). \*Correlation is significant at the 0.05 level (2-tailed).

forefront of pandemic. On the other side, 79% of interviewed GPs reported that trust relationship with patients was changed compared to the past as mostly due to technology and emergent needs for reorganization of the national health system, 55.8% reporting this translating into a negative change for the GP's profession, and 53.4% unsatisfied of territorial primary healthcare organization during the pandemic. Particularly, 83.7% felt not supported by local health institutions during the pandemic months, and 94.8% felt like a "hero" in this period.

In GPs, negative coping strategies were prevented by mindful attitude which lead to the solution of the problem as positive coping strategy, and this associated to attention and focus as mindful coping mechanisms. Differently, awareness and acceptance as mindful attitudes in nurses correlated with the avoidance of the problem. This major difference result suggests that nurses, differently from GPs, precisely because they accepted and consciously addressed the problem to others, avoiding solving it themselves as beyond their role and organizational responsibility. On the contrary the doctor had responsibility to provide by himself diagnostic and therapeutic responses for the patient, and this responsibility was taken over in case of the GP. In fact, GPs along with the demand for social support, focused on the problem trying to solve it by themselves, when predisposed by their mindful attitude. In this case we can assume that they put attention to the problem until its solution and without avoiding it.

Taken together, these results suggest that GPs took charge of the problem positively and tried to solve it by referring the patient to the competent structures where they were not able to treat them in their own. It is very important to underline that mindful attitude in GPs is the only one that leads to the solution of the problem, by taking place specifically through greater attention to the patient's request as a unique mindful coping strategy. On the other side, providing an important ward organization and the possibility to cope together with doctors and colleagues outlines a different context allowing for implementation of mindful coping strategies in nurses.

Doctors experience mindfulness as helping them to become more aware of stress, proactively set priorities and limits, and develop a healthier relationship to work in a stressful

practice environment (Verweij et al., 2018). On the other side, a good group organization is the preeminent work environment for developing mindful attitude in nurses, since they experience considerable job stress as a major factor in the high rates of burnout (Shimizu et al., 2003), and work related stress leads to a much higher turnover, especially during the first years post-graduate, lowering retention rates in general (Zangaro and Soeken, 2007; Botha et al., 2015). Comparing with GPs, mindfulness is most effective when embedded in an organizational approach that promotes a culture of wellness to doctors in various educational phases (from post-graduate to continuing medical education), when also addressing system-related demands and workloads (Panagioti et al., 2017; Shanafelt and Noseworthy, 2017; Panagopoulou and Montgomery, 2019). When hospital-based, doctors reported positive effects of group-based mindfulness interventions on their wellbeing with respect to anxiety and stress, or burnout and empowerment at work (Sood et al., 2011, 2014; West et al., 2014; Amutio et al., 2015; Pflugeisen et al., 2016). Working in solo, GPs similarly reported positive effects on psychological or occupational wellbeing (Krasner et al., 2009; Verweij et al., 2016; Hamilton-West et al., 2018). Qualitative findings related positive effects to specific mindfulness elements in GPs: self-awareness of stress and self-regulation of behaviors facilitated self-care of wellbeing (Verweij et al., 2016). However, a group-based setting promoting shared experience and peer support also appeared beneficial for wellbeing, and reducing GPs' sense of isolation from other physicians, nurses and health system in general (Beckman et al., 2012; Verweij et al., 2016). The GP's sense of responsibility therefore appears to be a determining factor in responses to anxiety and stress on emergency situations as pandemic, and in addressing coping strategies inside an organizational context where he had to decide alone for diagnosis and fate of his patients.

We suggest that self-awareness as the mindful attitude of attention to the problem could have adaptively addressed the sense of responsibility as the emotional correlate of anxiety in GPs. We know that adaptive or physiological anxiety prepares for potential danger and can contribute to coping with difficult situations (Perilli et al., 2020). It is defined pathological when occurring in inappropriate contexts with an excessive intensity on the continuum from moderate to extreme. Trait anxiety as measured in this study is the component inherent in the individual predisposition to respond to situation with more or less anxiety. Mindful attitude is a disposition that individuals can present to a greater or lesser extent, regardless of mindfulness practice. As the mind can be focused, disturbed, dreaming, slowed down, etc., it can also be mindful (Bruce et al., 2010). Even the practice of mindfulness, by training people to cultivate awareness for increasing periods of time and with constancy, can allow them to achieve a more mindful attitude and focus the problems toward their resolution, by reducing the personal predisposition to stress and burnout, and modulating responses with positive emotions (Perilli et al., 2020). A mindful attitude may be able to address, at least in part, GPs' current challenges in finding meaning in their work and connecting with patients in isolated and stressful practice environments as induced by pandemic reorganization (Shanafelt et al., 2012;



Zhu et al., 2021). After mindfulness training, doctors reported enhanced connection with patients as a better ability to listen deeply, be attentive to patients' concerns and effectively respond to their request (Krasner et al., 2009; Beckman et al., 2012; Lases et al., 2016; Bentley et al., 2018; Verweij et al., 2018). Patients positively recognized this attitude reporting that mindful clinicians (both doctors and nurses) communicated in a more patient-centered way, and engaged to a greater degree in psychosocial relationship (Beach et al., 2013).

Mindfulness-based interventions may therefore be proposed to enhance doctors' and nurses' empathic care, as well as for prevention of stress and burnout under reorganization of primary care as due to a sanitary emergency. In our study we demonstrated that GPs and nurses primarily activated the Request for social support as coping strategy. At this point in the pandemic, we can ask ourselves what social support tools were put in place by national health and social institutions to assess their impact on stress management in primary care clinicians. Psychological support interventions and assistance desks were activated and made available to clinicians as well as patients, but the conditions of isolation and the new rules of social distancing not always allowed these interventions to be effective in managing burning anxiety and stress. Psychologists themselves as doctors, have been subject to a drastic reorganization of their professional practice, many of them temporarily withdrawing for not being more able to receive patients give their support in effective way. Mindfulness-based interventions could be combined with organizational changes to promote a supportive work environment that reinforces and does not undermine the emergency measures. Mindfulness is to develop individual skills to manage stress, such as knowing how to listen and pay attention to the problem, to express emotions, to accept pain and knowing how to communicate with the patient and with the colleagues, to move in difficult contexts and solve extraordinary problems posed by the emergency. A mindful attitude can therefore prevent the chronicization of anxiety and the dysfunctional reactive behaviors in the GP, which operates alone in the context of the pandemic, as well as in the nurse subject to increased stress reaction for the victims and for anguish and aggression of hospitalized patients, by enhancing comfort and emotional support. The expression of emotions in an emergency context can be facilitated through the acquisition of the ability to understand

and deal with the strong emotional reactions connected to the traumatic event.

Our findings together with other promising on the long-term effects of mindfulness-based interventions (de Vibe et al., 2018) quote for intensified research on the effectiveness of incorporating mindfulness as a parameter into medical and nurse schools' curricula in order to equip graduates with skills that can be sustained throughout their clinical careers and that could be crucial for dealing with emergencies and to forefront 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 Internal Review Board (IRB) of the University of L'Aquila, Italy (Prot. No. 107751/2020). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

EP: conceptualization and project administration. MP, DB, and SM: methodology. MP and SM: software. EP, MP, and DB: validation. MP, DB, SM, and SC: formal analysis. MP, DD, and CC: resources. EP and SM: data curation. EP and SC: writing—original draft preparation. EP, MP, DB, FR, and SC: writing—review and editing. EP and MP: visualization. EP, DD, and SC: supervision. All authors contributed to manuscript revision, read, 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.2022.891470/full#supplementary-material>

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# Socioeconomic Inequalities in Times of COVID-19 Lockdown: Prevalence and Related-Differences in Measures of Anxiety and Stress in Palestine

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**Background:** Implementation of quarantine and lockdown to COVID-19 pandemic has created dramatic negative psychological impact mainly the general population's health worldwide. We aimed to assess the prevalence and predictors of anxiety and stress severity among the Palestinian population.

**Methods:** A cross-sectional web-based survey was conducted. An anonymous online questionnaire and snowball recruiting technique were used to target the general public in Palestine between 6 and 16 April, 2020 during COVID-19 pandemic lockdowns. Multivariate logistic regression models were developed for the outcome variables.

**Results:** Of the 2819 individuals who completed the questionnaire, more than two thirds of them (72.6%) were females. Nearly (83.5%), were residing at the West Bank. The mean age of participants was 29.47 ( $SD = 10.97$ ) years. The anxiety prevalence was (25.15%) with (20.08%) had mild/moderate severity. The stress prevalence was (38.77%) with (22.21%) had mild/moderate severity. The prevalence of both anxiety and stress was (20.3%). In multivariate analysis, exposure to confirmed case of COVID-19, inadequacy of food supply and jobs that acquire leaving home during lockdown were significantly related to higher anxiety degree. As for stress, low monthly income, cohabitation with a person of a high-risk group and inadequacy of food supply were significantly related to higher stress degree.

**Conclusion:** Young adults with low socioeconomic status and inadequate food supply were more likely to have a higher degree of stress and/or anxiety. Providing alternative economical sources for those in need, and spreading more awareness regarding the pandemic, supporting the population's psychological wellbeing, community connection and the availability of specialist mental health services are crucial to overcome the mental impacts of COVID-19 in Palestine.

**Keywords:** anxiety, COVID-19, lockdown, quarantine, stress

## BACKGROUND

On 31st December 2019, several cases of pneumonia with an unknown etiology were identified in Wuhan, China (Lu et al., 2020). By January 30th, 2020, the World Health Organization (WHO) declared the COVID-19 outbreak in China as a public health emergency of international concern casting a threat over countries with vulnerable health systems (Amer, 2018). In reaction to that, a lockdown was implemented during the COVID-19 pandemic, nearly at the global level (Brooks et al., 2020).

During outbreaks of infection, there would be a wide range of negative psychosocial impact on people as past studies shown (Hall et al., 2008). The ongoing COVID-19 pandemic is prompting fear, as people are likely to experience fear of getting infected or dying, feelings of helplessness, and stigma (Hall et al., 2008; Rubin et al., 2010; Wang et al., 2020). Recent studies of the impact of COVID-19 pandemic on mental health showed that post-traumatic stress disorder (PTSD) rates reaching up to 41% since the outbreak. Multiple factors associated with increasing psychological disturbances were identified, including female sex, lower socioeconomic status, interpersonal conflicts, frequent social media use and lower resilience and social support (Torales et al., 2020). The dynamics of psychological disturbances and their emergence during a pandemic is interwoven with daily activities. People would always seek information and updated data on the ongoing crisis, therefore, lacking of possible entrusted official resources for such information can drive people to the doubted, less accurate, fearful and highly exaggerated (European Observatory on Health Systems Policies, 2022). Social media windows usually have plenty of falsehoods, misinterpreted numbers and headlines, all together coming to burden the public leading to a fertile environment. In this situation, vulnerable populations, those of high risk for infection, being with a pre-existing medical condition, those in contact with confirmed cases of COVID-19 such as health care providers and the families of COVID-19 patients, can suffer far more than the general public during the pandemic (European Observatory on Health Systems Policies, 2022).

A meta-analysis with 71 studies showed that healthcare workers are experiencing significant levels of anxiety during the COVID-19 pandemic. The pooled prevalence of anxiety in healthcare workers including nurses, medical doctors and frontline healthcare workers was estimated to be 25% (Santabárbara et al., 2021a).

The implications of lockdown as a global response to COVID-19 may create a dramatic psychological and emotional impact on people (Hawryluck et al., 2004). According to updated meta-analysis of community-based studies during the COVID-19 pandemic, anxiety in the general population has increased threefold, and it appears to be highest at the initial phase and at the peak of the waves, with a prevalence of 25% as an average of 43 large studies (Santabárbara et al., 2021b). Mandatory contact tracing and 14 days quarantine could increase patients' and contacts' anxiety and guilt about the association of contagion, quarantine, and stigma on their families and friends (Xiang et al., 2020). Those in quarantine might experience boredom, loneliness, and anger. Isolation from loved ones,

the loss of freedom, and the closure of schools and business, negative emotions experienced by individuals are compounded (Van Bortel et al., 2016).

Moreover, a Systematic review concluded that sleep disturbances are among the psychological outcomes that affect general population during tough times of pandemic, and can cause depression and anxiety (Alimoradi et al., 2021). Another meta-analysis study that included 16 previous studies reported an average prevalence of anxiety of 38.12% among the general population (Necho et al., 2021). A Canadian study reported 28.9% post-traumatic stress disorder (PTSD) during the SARS outbreak. According to the same study, longer durations of quarantine were associated with an increased prevalence of PTSD symptoms. Acquaintance with or direct exposure to someone with a diagnosis of SARS was also associated with PTSD and depressive symptoms (Hawryluck et al., 2004). Many of the investigations on the psychological impact on the non-infected community, revealed significant psychiatric morbidities which were found to be associated with younger age and increased self-blame. Those who were older, female gender, more highly educated, with higher risk perceptions of SARS, a moderate anxiety level, a positive contact history, and those with SARS-like symptoms were more likely to take precautionary measures against the infection (Wang et al., 2020).

Surprisingly, positive aspects of the lockdown were identified by participants in a cross-sectional study in New Zealand for themselves personally and/or for society, such as more family time, work flexibility, social cohesion, the recreation of healthy habits, considering priorities in life, and environmental benefits brought by reduced travel (Every-Palmer et al., 2020).

On 22nd March 2020, Palestine went into a lockdown, requiring social distancing, wearing masks, postponing social events or even canceling them, closing markets, restaurants, gyms, banks, schools, universities, etc. That had been last 43 days (up to 5th May 2020). The psychological and coping responses of the community during the lockdown are unknown. This study aimed to assess the prevalence and predictors of anxiety and stress severity among the Palestinian population. Understanding the experiences of the population during lockdown is critical to maximize infectious disease containment and minimize the negative associations on those quarantined, their families, and social networks.

## MATERIALS AND METHODS

### Study Population, Sample, and Setting

The population was comprised of all people 18 years or older living in Palestine during the lockdown. We adopted a cross-sectional survey design to find the prevalence of stress and anxiety among the public and to identify the possible risk factors during the COVID-19 pandemic by using an anonymous online questionnaire. A snowball sampling strategy focused on recruiting the general public. The online survey was first disseminated as link to the Google form on Facebook to friends and they were encouraged to pass it on to others. Facebook was the best available option in Palestine during the lockdown.



**TABLE 1** | Bivariate analysis of socio-demographic characteristics with anxiety and stress severity (*P*-value presented was Chi-square significance; *N* = 2819).

Variables	<i>N</i> (%)	Anxiety severity			<i>P</i> -value	Stress severity			<i>P</i> -value
		Normal <i>n</i> = 2110	Mild to moderate <i>n</i> = 566	Severe to extremely severe <i>n</i> = 143		Normal <i>n</i> = 1726	Mild to moderate <i>n</i> = 626	Severe to extremely severe <i>n</i> = 467	
<b>Age</b>	2819 (100)	Mean = 30.06 <i>SD</i> = 11.18	Mean = 27.86 <i>SD</i> = 10.27	Mean = 27.10 <i>SD</i> = 9.60	<0.001* (ANOVA-test)	Mean = 31.15 <i>SD</i> = 11.77	Mean = 27.34 <i>SD</i> = 9.33	Mean = 26.10 <i>SD</i> = 8.38	<0.001* (ANOVA-test)
<b>Sex</b>									
Male	768 (27.2)	619 (29.3)	112 (19.8)	37 (25.9)	<0.001*	549 (31.8)	140 (22.4)	79 (16.9)	<0.001*
Female	2051 (72.8)	1491 (70.7)	454 (80.2)	106 (74.1)		1177 (68.2)	486 (77.6)	388 (83.1)	
<b>Social status</b>									
Single	1449 (51.4)	1040 (49.3)	325 (57.4)	84 (58.7)	0.001*	822 (47.6)	344 (55)	283 (60.6)	<0.001*
Relationship	1370 (48.6)	1070 (50.7)	241 (42.6)	59 (41.3)		904 (52.4)	282 (45)	184 (39.4)	
<b>Residency</b>									
Village	1380 (49)	1047 (49.6)	275 (48.6)	58 (40.6)	0.184	865 (50.1)	306 (48.9)	209 (44.8)	0.08
City	1292 (45.8)	958 (45.5)	261 (46.1)	73 (51)		780 (45.2)	289 (46.2)	223 (47.8)	
Camp	147 (5.2)	105 (5)	30 (5.3)	12 (8.4)		81 (4.7)	31 (5)	35 (7.5)	
<b>Geographic area</b>									
West Bank	2354 (83.5)	1778 (84.3)	465 (82.2)	111 (77.6)	0.066	1464 (84.8)	518 (82.7)	372 (79.7)	0.011*
Gaza strip	270 (9.6)	189 (9)	58 (10.2)	23 (16.1)		149 (8.6)	57 (9.1)	64 (13.7)	
Jerusalem	195 (6.9)	143 (6.8)	43 (7.6)	9 (6.3)		113(6.5)	51 (8.1)	31 (6.6)	
<b>Educational level</b>									
Secondary or less	326 (11.6)	241 (11.4)	69 (12.2)	16 (11.2)	0.127	206 (11.9)	73 (11.7)	47 (10.1)	0.018*
College	2211 (78.4)	1647 (78.1)	456 (80.6)	108 (75.5)		1323 (76.7)	506 (80.8)	382 (81.8)	
Master or doctorate	282 (10)	222 (10.5)	41 (7.2)	19 (13.3)		197 (11.4)	47 (7.5)	38 (8.1)	
<b>Health care worker</b>									
Yes	332 (11.8)	251 (11.9)	62 (11)	19 (13.3)	0.701	1534 (88.9)	555 (88.7)	398 (85.2)	0.088
No	2487 (88.2)	1859 (88.1)	504 (89)	124 (86.7)		192 (11.1)	71 (11.3)	69 (14.8)	
<b>Monthly income (NIS)*</b>									
<2000	568 (20.1)	399 (18.9)	126 (22.3)	43 (30.1)	0.011*	303 (17.6)	145 (23.2)	120 (25.7)	<0.001*
2000–5000	1552 (55.1)	1177 (55.8)	309 (54.6)	66 (46.1)		970 (56.2)	349 (55.7)	223 (49.9)	
>5000	699 (24.8)	534 (25.3)	131 (23.1)	34 (23.8)		453 (26.2)	132 (21.1)	114 (24.4)	
<b>Smoking/Shisha</b>									
Yes	693 (24.6)	511 (24.2)	143 (25.3)	39 (27.3)	0.653	415 (24)	156 (24.9)	122 (26.1)	0.635
No	2126 (75.4)	1599 (75.8)	423 (74.7)	104 (72.7)		1311 (76)	470 (75.1)	345 (73.9)	
<b>Cohabiting with someone in a high-risk group</b>									
Yes	1283 (45.5)	911 (43.2)	292 (51.6)	80 (55.9)	<0.001*	747 (43.3)	291 (46.5)	245 (52.5)	0.002*
No	1536 (54.5)	1199 (56.8)	274 (48.4)	63 (44.1)		979 (56.7)	335 (53.5)	222 (47.5)	

\*One NIS = 0.28 US Dollars.

As our sampled population was larger than 20000 (2.5 million above 18 years old), and with an expected prevalence proportion in the population between (0.2–0.5), a sample size between (246–385) or more was calculated as the minimum number of necessary subjects to meet a confidence level of 95% that the real value will be within  $\pm 5\%$  margin of error of the measured/surveyed value with a power analysis of 20% according to the equation of unlimited population:

$n = Z^2 \times P(1-P) / \epsilon^2$ ; where *z* is the *z* score; *p* the population proportion;  $\epsilon$  the margin of error and *n* the sample size.

## Procedure

As the Palestinian Government recommended the public to minimize face-to-face interaction and individual isolation at home, potential respondents were electronically invited. They

completed the questionnaires in Arabic through an online Google Form survey. Expedited ethics approval was obtained from the Institutional Review Board (IRB) at An-Najah National University (Faculty of Medicine and Health Sciences). Privacy and confidentiality of personal data were strictly protected during the procedure. The aims and the information about the study including objectivity, beneficence, non-maleficence, individual autonomy, and justice (fairness) were posted on the first page of the questionnaire. All respondents provided electronic informed consent before starting the questionnaire. The IRB approved our request for a waiver of documentation of this method of obtaining consent. All collected data transferred automatically to a protected excel sheet and only the researchers had access to this information. Data collection took place over 10 days (6–16 April 2020), 2 weeks after the beginning of the COVID-19 lockdown.

At that time, lockdown and strict measures of social distancing and isolation were applied by the force of law.

## Survey Development

It is worth mentioning that this study was published as a preprint in the research square platform (Al Zabadi et al., 2021a). Previous surveys on the assessment of mental health during the lockdown during outbreaks were reviewed (Liu et al., 2020). 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) socio-demographic characteristics, (3) knowledge and concerns about the lockdown, (4) precautionary measures against COVID-19, and (5) the Depression Anxiety Stress Scales (DASS). All of these sections, except the DASS scale section, were developed by the authors. A pilot study was performed on a small group of volunteers for feedback to identify ambiguities, difficult questions, record the time needed to complete the online questionnaire; thus, minor rewording was done to clarify the meaning and questions related to the COVID-19 pandemic and lockdown. This study is a continuation of a two published papers regarding depression (Al Zabadi et al., 2020) and quarantine understanding and adherence (Al Zabadi et al., 2021b) on the same population.

## Study Measures

In the socio-demographic characteristics section, respondents were asked to answer questions about their age, sex, educational level, social status. Information also included self-report of cohabitation with someone who is of a high-risk group (pre-existing medical condition, those of high risk for infection, those in contact with confirmed cases of COVID-19 such as health care providers and the families of COVID-19 patients). Furthermore, according to the last update of the Palestinian Central Bureau of Statistics (PCBS) in 2017, the average monthly household expenditure in the Palestinian population was 5000 NIS (One NIS = 0.28 US Dollars) (PCBS, 2021a) and Deep Line Poverty was 2000 NIS (PCBS, 2021b). Using these data, we considered monthly income of less than 2000 NIS as low monthly income, between 2000 and 5000 NIS as average monthly income, and more than 5000 NIS as high monthly income.

In **Table 1**, knowledge and concerns about the lockdown section included questions about the type of lockdown, the duration of lockdown, the source of information about the pandemic and lockdown measures, the adequacy of information. Other five questions aimed to assess lockdown understanding, which reflects the knowledge and information the person has about the pandemic and lockdown (**Table 2**). It was initially evaluated through five statements: (1) lockdown is needed where I live; (2) not committing to lockdown measures will raise the number of cases; (3) measures taken by the government are necessary; (4) lockdown should not only be limited to infected people and those who are in contact with them; and (5) hygiene measures in the house are part of lockdown. A 5-point Likert scale [strongly agree (4), agree (3), neutral (2), disagree (1), and totally disagree (0)] was used to respond to each statement. By summing the points of each statement, a scale from 0 to 20 was

created for each respondent. We then used the median as the cutoff point to categorize this outcome into a low level (0–17) and a high level (18–20).

Precautionary measures against COVID-19 section included 5 questions to assess staying home adherence, and five questions to assess in-home precautions adherence. Staying home adherence reflects the compliance of the individual to the main instruction given by the government: “Do not leave the house if it is not necessary” (**Table 2**). It was initially evaluated through five statements: (1) going grocery shopping or to the bakery; (2) going out meeting friends or family; (3) going out to spend time and have fun; (4) attending social events; and (5) going to the pharmacy. The answer to each statement was composed of [never going out (3), some days (2), more than half of days (1), and every day (0)].

In-home precautions adherence reflects the compliance to infection control measures while staying inside the home to minimize the spread of infection between family members. It was initially evaluated through five statements: (1) washing hands for 20 s or more; (2) decrease the time of interaction with other family members; (3) washing hands after returning from outside; (4) sneezing appropriately according to guidelines (using a tissue or using elbow); and (5) not sharing towels and items between family members. The answer to each statement was composed of [never do them (0), do them sometimes (1), do them most of the time (2), and always do them (3)].

For these last two outcomes separately, we summed up the points of each statement. A scale from 0 to 15 was created for each respondent. Then the median was used as the cutoff point to categorize staying home adherence outcome to a low level (0–12) and a high level (13–15) while categorizing in-home precautions adherence outcome to a low level (0–10) and a high level (11–15).

In the Depression Anxiety Stress Scale (DASS) section, we used the Arabic form of the DASS-21 scale. It 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 DASS-21, is available with 7 items per scale (UNSW, 2021). The DASS-21 scale showed excellent Cronbach's alpha values of 0.81, 0.89, and 0.78 for the subscales of depressive, anxiety, and stress respectively (Coker et al., 2018). In this study, Cronbach alpha was 0.82 (anxiety), and 0.89 (stress) which indicating high consistency for the relevant psychometric scales.

The results of DASS-21 supported the universality of depression, anxiety, and stress across cultures (Moussa et al., 2017). The DASS-21 scale was developed from the original DASS-42, which was invented by Sydney H. Lovibond and Peter F. C. Lovibond (1995) (Lu et al., 2018). It has been widely used since its development and showed good psychometric properties (factorial validity and reliability), so it can be used as a reliable and valid instrument for measuring depression, anxiety, and stress symptoms (Antony et al., 1998; Vasconcelos-Raposo et al., 2013; Beaufort et al., 2017; Le et al., 2017; Lu et al., 2018).

The anxiety subscale of DASS-21 assesses autonomic arousal, skeletal muscle association, situational anxiety, and subjective experience of anxious affect. The Stress scale assesses difficulty relaxing, nervous arousal, and being easily upset/agitated,

**TABLE 2 |** Bivariate analysis of lockdown characteristics with anxiety and stress severity (*P*-value presented was Chi-square significance; *N* = 2819).

Variables	N (%)	Anxiety severity			P-value	Stress severity			P-value
		Normal n = 2110	Mild to moderate n = 566	Severe to extremely severe n = 143		Normal n = 1726	Mild to moderate n = 626	Severe to extremely severe n = 467	
Do you agree that lockdown is important?									
Yes	2763 (98)	2069 (98.1)	553 (97.7)	141 (98.6)	0.758	1693 (98.1)	612 (97.8)	458 (98.1)	0.879
No	56 (2)	41 (1.9)	13 (2.3)	2 (1.4)		33 (1.9)	14 (2.2)	9 (1.9)	
Type of lockdown									
I have to work outside the home	421 (14.9)	309 (14.6)	79(14)	33 (23.1)	0.018*	269 (15.6)	87 (13.9)	65 (13.9)	0.476
Obligated to stay at home	2398 (85.1)	1801 (85.4)	487(86)	110 (76.9)		1457 (84.4)	539 (86.1)	402 (86.1)	
Any relative or close contact confirmed as COVID-19 positive?									
Yes	85 (3)	54 (2.6)	23 (4.1)	8 (5.6)	0.032*	44 (2.5)	25 (4)	16 (3.4)	0.165
No	2734 (97)	2056 (97.4)	543 (95.9)	135 (94.4)		1682 (97.5)	601 (96)	451 (96.6)	
Fear of getting or transmitting COVID-19									
Yes	2173 (77.1)	1582 (75)	478 (84.5)	113 (79)	<0.001*	1284 (74.4)	519 (82.9)	370 (79.2)	<0.001*
No	646 (22.9)	528 (25)	88 (15.5)	30 (21)		442 (25.6)	107 (82.9)	97 (20.8)	
Adequately informed about lockdown									
Yes	2262 (80.2)	1722 (81.6)	432 (76.3)	108 (75.5)	0.007*	1424 (82.5)	487 (77.8)	351 (75.2)	<0.001*
No	557 (19.8)	388 (18.4)	134 (23.7)	35 (24.5)		302 (17.5)	139 (22.2)	116 (24.8)	
Source of information									
Television or radio	525 (18.6)	392 (18.6)	102 (18)	31 (21.7)	0.038*	354 (20.5)	101 (16.1)	70 (15)	0.001*
Official government agencies	359 (12.7)	274 (13)	71 (12.5)	14 (9.8)		232 (13.4)	66 (10.5)	61 (13.1)	
A health care worker	159 (5.6)	124 (5.9)	21 (3.7)	14 (9.8)		102 (5.9)	30 (4.8)	27 (5.8)	
Social media	1676 (59.5)	1255 (59.5)	344 (60.8)	77 (53.8)		991 (57.4)	401 (64.1)	284 (60.8)	
Conversation with other people	100 (3.6)	65 (3.1)	28 (4.9)	7 (4.9)		47 (2.7)	28 (4.5)	25 (5.4)	
Enough food supply to withstand lockdown period									
Yes	1994 (70.7)	1539 (72.9)	371 (65.5)	84 (58.7)	<0.001*	1287 (74.6)	417 (66.6)	290 (62.1)	<0.001*
No	825 (29.3)	571 (27.1)	195 (34.5)	59 (41.3)		439 (25.4)	209 (33.4)	177 (37.9)	
Lockdown duration									
1–2 weeks	187 (6.6)	148 (7)	27 (4.8)	12 (8.4)	0.179	119 (6.9)	38 (6.1)	30 (6.4)	0.262
2–3 weeks	847 (30.1)	650 (30.8)	154 (27.2)	43 (30.1)		541 (31.3)	182 (29.1)	124 (26.6)	
3–4 weeks	786 (27.9)	578 (27.4)	172 (30.4)	36 (25.2)		474 (27.5)	167 (26.7)	145 (31)	
> 4 weeks	999 (35.4)	734 (34.8)	213 (37.6)	52 (36.4)		592 (34.3)	239 (38.2)	168 (36)	
Average hours outside home before lockdown									
<2 h	584 (20.7)	430 (20.4)	121 (21.4)	33 (23.1)	0.399	341 (19.8)	144 (23)	99 (21.2)	0.200
2–6 h	776 (27.5)	596 (28.2)	140 (24.7)	40 (28)		483 (28)	181 (28.9)	112 (24)	
7–10 h	1075 (38.2)	808 (38.3)	221 (39)	46 (32.2)		672 (38.9)	216 (34.5)	187 (40)	
> 10 h	384 (13.6)	276 (13.1)	84 (14.8)	24 (16.8)		230 (13.3)	85 (13.6)	69 (14.8)	
Staying home adherence									
Low level	1144 (40.6)	946 (44.8)	263 (46.5)	74 (51.7)	0.242	792 (45.9)	291 (46.5)	200 (42.8)	0.428
High level	1675 (59.4)	1164 (55.2)	303 (53.5)	69 (48.3)		934 (54.1)	335 (53.5)	267 (57.2)	
In-home precautions adherence									
Low level	1261 (44.7)	842 (39.9)	229 (40.5)	73 (51)	0.032*	714 (41.4)	252 (40.3)	178 (38.1)	0.439
High level	1558 (55.3)	1268 (60.1)	337 (59.5)	70 (49)1		1012 (58.6)	374 (59.7)	289 (61.9)	
Lockdown understanding									
Low level	1283 (45.5)	946 (44.8)	250 (44.2)	65 (45.5)	0.946	774 (44.8)	284 (45.4)	203 (43.5)	0.814
High level	1536 (54.5)	1164 (55.2)	316 (55.8)	78 (54.5)		952 (55.2)	342 (54.6)	264 (56.5)	
Self-rating of lockdown commitment	2819 (100)	Mean = 8.49 SD = 1.81	Mean = 8.60 SD = 1.88	Mean = 8.15 SD = 2.11	0.034* (ANOVA-test)	Mean = 8.45 SD = 1.84	Mean = 8.52 SD = 1.81	Mean = 8.63 SD = 1.87	0.149 (ANOVA-test)

\*Indicates significant *P*-value.

irritable/over-reactive, and impatient. 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 in:

- 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.

Anxiety and stress scores were calculated by summing the scores for the relevant items. The scores on the DASS-21 were multiplied by 2 to calculate the final score. Scores are shown as the following (Xiang et al., 2020):

Anxiety scores: Normal (0–7), mild (8–9), moderate (10–14), severe (15–19), and extremely severe (20+). Stress scores: Normal (0–14), mild (15–18), moderate (19–25), severe (26–33), and extremely severe (34+). DASS-21 scores may be presented in five categorical levels. However, in this study, and according to a standardized cut-offs, we merged mild with moderate and severe with extremely severe cut-off scores to facilitate the multivariate analysis, as some cells showed less than 5 cases in some categorical independent variables and this is usually acceptable (Allabadi et al., 2019).

## Statistical Analysis

Data were entered into the 27th version of IBM SPSS Software (IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY, United States: IBM Corp). We conducted the descriptive analysis (median, mean, and standard deviation) for continuous variables and (frequencies/percentages) for categorical independent variables. Independent *t*-test was used to test for significance among continuous variables and Chi-square test for categorical variables. Variables showed to be significant in bivariate analysis (with *P*-value less than 0.05) were included in the multinomial logistic regression models to predict the factors associated with each anxiety and stress severity degrees and presented as odds ratio and 95% CI.

## RESULTS

### Characteristics of the Study Population

In this study, 2819 individuals completed and returned the questionnaire (Table 1). The mean (range) age of respondents was 29.47 (18–71) years with SD of 10.97 years. More than two thirds (72.6%) of respondents were females. Almost half of them (51.4%) were single. The majority lived in the West Bank (83.5%) and only 9.6% in Gaza. Around 55.1% had an average monthly income of 2000–5000 New Israeli Shekels per month (One NIS = 0.28 US Dollars).

Most of the participants (78.4%) were college students or recent graduates. Another 10% were masters or doctoral students. Almost one quarter (24.6%) were smokers and only 11.8% were health care workers. About 45.5% reported cohabitation with someone who is of a high-risk group. Results showed that 59.4,

55.3, and 54.5% of respondents reported high levels of staying home adherence, in-home precautions adherence, and lockdown understanding; respectively.

### Lockdown Characteristics of the Population

As shown in Table 2, 98% of respondents believed that lockdown is important, and 77.1% expressed fear of getting COVID-19 or transmitting it to others. Only 14.9% had jobs that required them to go outdoors, and only 3% had at least one relative with confirmed COVID-19. The two most common sources of information about the lockdown measures were social media and television or radio (59.5 and 18.6%, respectively). Nearly, 80.2% considered themselves as properly informed about the lockdown. In addition, 29.3% self-reported inadequate food supply to withstand the lockdown period.

Duration in lockdown at the time the participants filled the survey ranged from less than 2 weeks in 6.6% to more than 4 weeks in 35.4% of the participants. Most people (38.2%) used to spend between 6 and 10 h outside the home before lockdown, 20.7% spent less than 2 h and only 13.6% spent more than 10 h (see Table 2 for more details).

### Prevalence of Anxiety and Stress in a Bivariate Analysis

The prevalence of anxiety was 25.15% ( $n = 709$ ; 20.08% with mild/moderate and 5.07% with severe/extremely severe). The prevalence of stress was 38.77% ( $n = 1093$ ; 22.21% with mild/moderate and 16.56% with severe/extremely severe).

In bivariate analysis, a statistically significant association was found between age (Figures 1, 2), sex (Figures 3, 4), social status, monthly income, and cohabitation with someone who was at high-risk group with both anxiety and stress severity ( $p$ -value < 0.05; Table 1). Geographic area and educational level were also found to be statistically significant with stress severity, but not with anxiety.

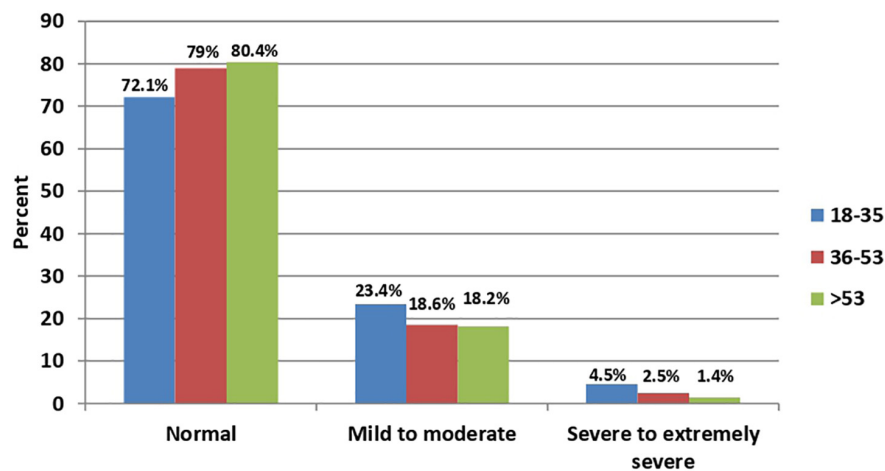
On the other hand, the type of lockdown, having relatives or acquaintances infected, and the in-home precautions adherence were statistically significant with anxiety but not stress. Fear of getting or transmitting COVID-19, proper information about lockdown, the source of information, and enough food supply to withstand the lockdown were significant in both anxiety and stress ( $p$ -value < 0.05; Table 2).

The fear of transmission had strong associations with higher levels of anxiety and stress severities ( $p$ -value < 0.001, Table 2). People who complained of inadequate food supply to withstand the lockdown period made the majority in all categories of both anxiety and stress ( $p$ -value < 0.001, Table 2). High-level commitment represented the majorities in the normal and the mild to moderate categories in the anxiety severity with 60.1 and 59.5%, respectively (Table 2).

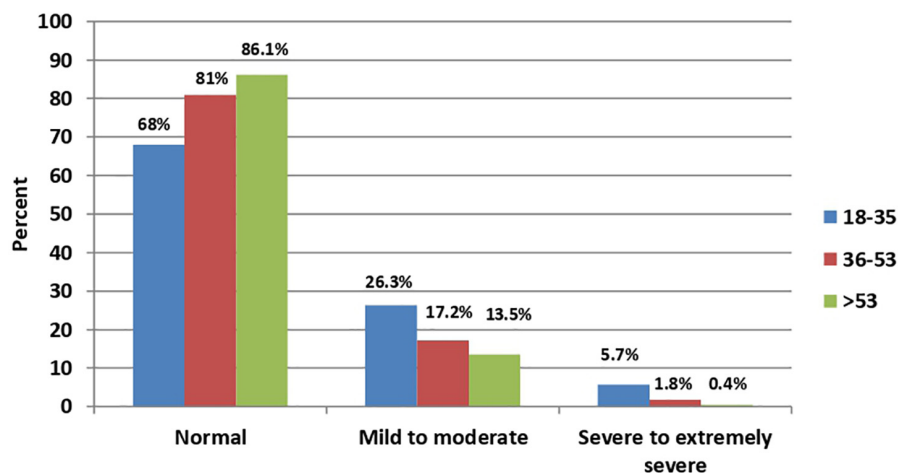
### Multinomial Analysis of Anxiety Severity Predictors

A multinomial regression model for the variables associated with anxiety severity is shown in Table 3. As shown, cohabitation





**FIGURE 1** | Age distribution among anxiety severity ( $P$ -value < 0.001;  $N$  = 2,819).



**FIGURE 2** | Age distribution among stress severity ( $P$ -value < 0.001;  $N$  = 2,819).

with someone at high-risk group was significantly predictive of anxiety severity (mild/moderate [OR (95%CI) = 0.72 (0.60–0.87)] and severe/extremely severe degrees [OR (95%CI) = 0.62 (0.44–0.88)]). People who reported knowing or being in contact with any confirmed case of COVID-19 personally were significantly more likely to have higher anxiety degree compared to people who reported not knowing or being in contact with confirmed cases (mild/moderate [OR (95%CI) = 0.57 (0.34–0.94)] and severe/extremely severe degrees [OR (95%CI) = 0.41 (0.19–0.90)]).

Those who reported inadequate food supply during lockdown were more likely to have a higher degree of anxiety (mild/moderate [OR (95%CI) = 1.52 (1.23–1.88)] and severe/extremely severe degrees [OR (95%CI) = 1.88 (1.30–2.74)]).

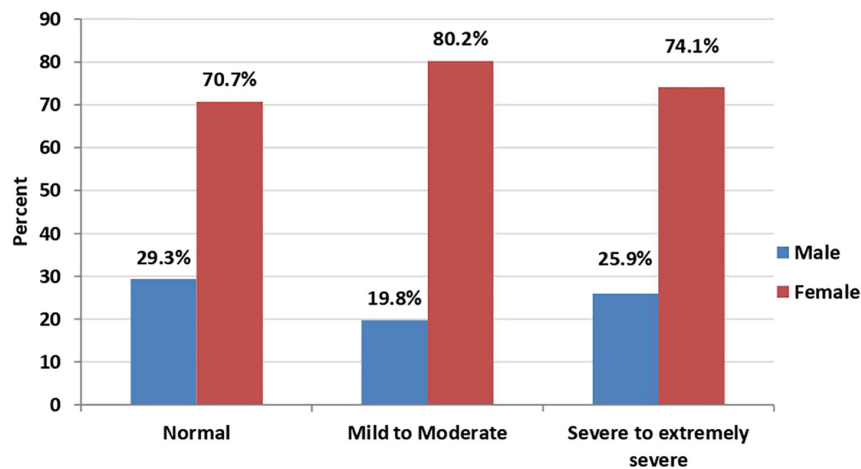
Males were significantly less likely to have mild/moderate anxiety compared to females [OR (95%CI) = 0.057 (0.44–0.72)]. Those with essential jobs (that required leaving home

even during lockdown) were significantly more likely to have severe/extremely severe anxiety compared to those who were asked by the government to stay at home [OR (95%CI) = 1.62 (1.04–2.51)]. Moreover, having adequate information about lockdown measures and no fear of being infected were significantly protective against anxiety (see **Table 3**).

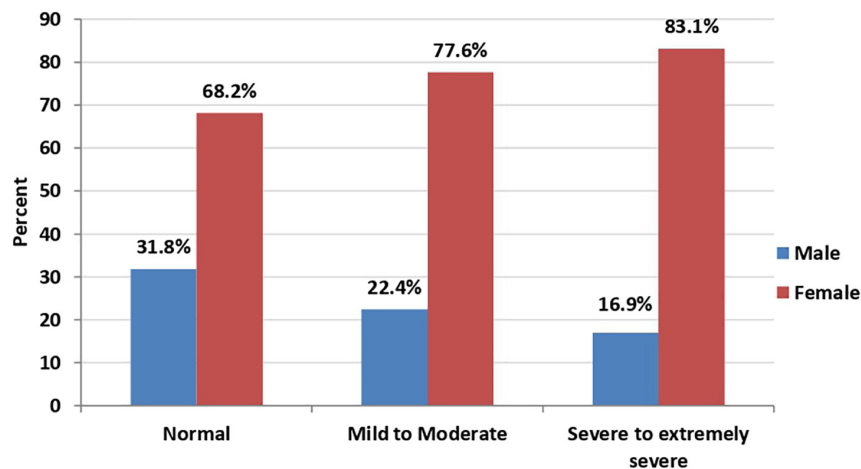
It should be noted that age, social status, monthly income, in-home precautions adherence level, self-rating of commitment, and source of information did not remain significant after adjusting for other variables in the multinomial regression model.

## Multinomial Analysis of Stress Severity Predictors

Multinomial regression model for the variables associated with stress severity is shown in **Table 4**. As shown, age was inversely associated with stress severity (mild/moderate degree [OR (95%CI) = 0.97 (0.95–0.98)] and severe/extremely severe [OR



**FIGURE 3 |** Sex distribution among anxiety severity ( $P$ -value < 0.001;  $N = 2,819$ ).



**FIGURE 4 |** Sex distribution among stress severity ( $P$ -value < 0.001;  $N = 2,819$ ).

(95%CI) = 0.96 (0.94–0.97)]. Males were less likely to report either mild/moderate or severe/extremely severe degrees of stress compared to females ([OR (95%CI) = 0.64 (0.51–0.81)], [OR (95%CI) = 0.40 (0.30–0.52)], respectively).

Those who reported inadequate food supply during lockdown were more likely to have a higher degree of stress compared to those who did not (mild/moderate degree [OR (95%CI) = 1.49 (1.20–1.85)] and severe/extremely severe [OR (95%CI) = 1.96 (1.54–2.49)]). Cohabitation with someone at the high-risk group was a significant predictor of severe/extremely severe stress degree [OR (95%CI) = 0.67 (0.54–0.82)]. Having adequate information about lockdown measures and no fear of being infected were significantly protective against stress (see **Table 4**).

Those with a low monthly income (less than 2000 New Israeli Shekels) were significantly more likely to have mild/moderate stress compared to average and high monthly incomes [OR (95%CI) = 1.41 (1.03–1.91)]. Those who reported television or radio as a source of information were significantly less likely

to have higher stress degree compared to people who depend on a conversation with other people as source of information (mild/moderate degree [OR (95%CI) = 0.56 (0.32–0.95)] and severe/extremely severe [OR (95%CI) = 0.52 (0.29–0.92)]).

Finally, residing in Gaza was found to be significantly protective against stress severity compared to the West Bank and Jerusalem. It should be noted that social status and educational level did not remain significant after adjusting for other variables in the multinomial regression model.

## DISCUSSION

In this study, the prevalence of anxiety and stress among the Palestinian general population during the COVID-19 pandemic lockdown were found to be 25.15 and 38.77%; respectively. It is worth noting that 20.3% of our population was found to have both anxiety and stress, and only 4.2% have a severe/extremely

**TABLE 3 |** Multinomial regression model for the variables associated with anxiety severity<sup>#</sup> (N = 2819).

Variable	Mild to moderate				Severe to extremely severe			
	B	SE	OR (95%CI)	P-value	B	SE	OR (95%CI)	P-value
<b>Age</b> (continuous)	− 0.11	0.006	0.99 (0.98–1.00)	0.070	− 0.02	0.012	0.98(0.96–1.00)	0.056
<b>Sex</b>								
Male	− 0.75	0.126	0.57 (0.44–0.72)	<0.001*	− 0.40	0.215	0.67 (0.44–1.02)	0.061
Female*	—	—	—	—	—	—	—	—
<b>Social status</b>								
Single	0.23	0.126	1.25 (0.98–1.61)	0.073	− 0.12	0.229	1.13 (0.72–1.77)	0.605
Relationship*	—	—	—	—	—	—	—	—
<b>Monthly income (NIS)</b>								
<2000	0.05	0.151	1.05 (0.78–1.41)	0.749	0.21	0.256	1.23 (0.74–2.03)	0.421
2000–5000	0.01	0.121	1.01 (0.80–1.28)	0.929	− 0.23	0.224	0.80 (0.51–1.23)	0.307
> 5000*	—	—	—	—	—	—	—	—
<b>Cohabitation with someone in a high-risk group</b>								
No	− 0.33	0.097	0.72 (0.60–0.87)	0.001*	− 0.48	0.178	0.62 (0.44–0.88)	0.007*
Yes*	—	—	—	—	—	—	—	—
<b>Type of lockdown</b>								
I have to work outside the home	0.02	0.145	1.02 (0.77–1.35)	0.905	0.48	0.224	1.62 (1.04–2.51)	0.033*
Obligated to stay at home*	—	—	—	—	—	—	—	—
<b>Any relative or close contact confirmed as COVID-19 positive?</b>								
No	− 0.57	0.260	0.57 (0.34–0.94)	0.029*	− 0.89	0.399	0.41 (0.19–0.90)	0.026*
Yes*	—	—	—	—	—	—	—	—
<b>Fear of getting or transmitting COVID-19</b>								
No	− 0.61	0.130	0.55 (0.42–0.70)	< 0.001*	− 0.31	0.219	0.73 (0.48–1.13)	0.155
Yes*	—	—	—	—	—	—	—	—
<b>Adequately informed about lockdown</b>								
No	0.30	0.120	1.35 (1.06–1.71)	0.013*	0.20	0.214	1.22 (0.80–1.85)	0.361
Yes*	—	—	—	—	—	—	—	—
<b>Source of information</b>								
Television or radio	− 0.38	0.263	0.68 (0.41–1.14)	0.148	0.12	0.459	1.13 (0.46–2.77)	0.795
Official government agencies	− 0.43	0.274	0.65 (0.38–1.11)	0.117	− 0.41	0.503	0.66 (0.25–1.78)	0.414
A health care worker	− 0.93	0.336	0.39 (0.20–0.76)	0.006*	0.22	0.505	1.25 (0.47–3.36)	0.659
Social media	− 0.47	0.243	0.63 (0.39–1.01)	0.054	0.35	0.430	0.71 (0.30–1.64)	0.416
Conversation with other people*	—	—	—	—	—	—	—	—
<b>Enough food supply to withstand lockdown period</b>								
No	0.42	0.109	1.52 (1.23–1.88)	< 0.001*	0.63	0.191	1.88 (1.30–2.74)	0.001*
Yes*	—	—	—	—	—	—	—	—
<b>In-home precautions adherence</b>								
Low level	− 0.03	0.099	0.97 (0.80–1.18)	0.761	0.00	0.180	1.00 (0.70–1.42)	0.998
High level*	—	—	—	—	—	—	—	—
<b>Self-rating lockdown commitment</b> (continuous)	0.12	0.030	1.01 (0.96–1.07)	0.680	− 0.07	0.047	0.94 (0.86–1.03)	0.159

<sup>#</sup>Reference category: Normal; \*Reference category (One NIS = 0.28 US Dollars).

OR, odds ratio; CI, confidence interval; SE, standard error.

Likelihood Ratio Test of the final model fitting significance was < 0.001. Pearson chi-square test for model goodness-of-fit significance was 0.30.

severe degree of both anxiety and stress. Comparable data concerning the Palestinian population prior to the COVID-19 lockdown are not readily available. The best available data come from a previous study conducted 13 years ago in the West Bank and Gaza. This study reported a prevalence of anxiety of 16.3% and acute stress of 8.3% in adults (Espíe et al., 2009).

At the global level, a recent study in Italy used DASS-21 scale. It reported a prevalence of 18.7% of anxiety and 27.2% of stress in the Italian general population during COVID-19 pandemic

(Mazza et al., 2020). Another study in Northern Spain found that the anxiety rate was 26.02% and the stress rate was 33.5% in the Spanish population during the same period (Ozamiz-Etxebarria et al., 2020). In United Kingdom, it was found that the prevalence of anxiety was 21.63% during the COVID-19 pandemic (Shevlin et al., 2020). In China, a study used the DASS-21 scale and found a prevalence of 37.4% of anxiety and 32.1% of stress (Wang et al., 2020). Our findings regarding anxiety and stress prevalence in the Palestinian population are comparable to those found in other

**TABLE 4 |** Multinomial regression model for the variables associated with stress severity<sup>#</sup> (N = 2819).

Variable	Mild to moderate				Severe to extremely severe			
	B	SE	OR (95%CI)	P-value	B	SE	OR (95%CI)	P-value
<b>Age</b> (continuous)	−0.04	0.006	0.97 (0.95–0.98)	<0.001*	−0.05	0.008	0.96(0.94–0.97)	<0.001*
<b>Sex</b>								
Male	−0.44	0.116	0.64 (0.51–0.81)	<0.001*	−0.93	0.143	0.40 (0.30–0.52)	<0.001*
Female*	—	—	—	—	—	—	—	—
<b>Social status</b>								
Single	−0.11	0.125	0.90 (0.70–1.15)	0.394	−0.02	0.142	0.98 (0.74–1.30)	0.901
Relationship*	—	—	—	—	—	—	—	—
<b>Geographic area</b>								
West Bank	−0.29	0.185	0.75 (0.52–1.08)	0.121	0.00	0.222	1.00 (0.65–1.55)	0.999
Gaza	−0.57	0.245	0.56 (0.35–0.91)	0.019*	0.09	0.271	1.09 (0.64–1.86)	0.749
Jerusalem*	—	—	—	—	—	—	—	—
<b>Educational level</b>								
Secondary or less	0.08	0.223	1.09 (0.70–1.68)	0.711	−0.22	0.256	0.80 (0.49–1.32)	0.387
College	0.10	0.180	1.11 (0.78–1.57)	0.578	−0.13	0.201	0.88 (0.59–1.31)	0.527
Master or doctorate*	—	—	—	—	—	—	—	—
<b>Monthly income (NIS)</b>								
<2000	0.34	0.157	1.41 (1.03–1.91)	0.030*	0.07	0.170	1.08 (0.77–1.50)	0.661
2000–5000	0.18	0.123	1.19 (0.94–1.52)	0.156	−0.16	0.136	0.86 (0.66–1.12)	0.254
> 5000*	—	—	—	—	—	—	—	—
<b>Cohabitation with someone in a high-risk group</b>								
No	−0.14	0.097	0.87 (0.72–1.06)	0.164	−0.41	0.109	0.67 (0.54–0.82)	< 0.001*
Yes*	—	—	—	—	—	—	—	—
<b>Fear of getting or transmitting COVID-19</b>								
No	−0.53	0.124	0.59 (0.46–0.75)	< 0.001*	−0.26	0.133	0.77 (0.60–1.01)	0.055
Yes*	—	—	—	—	—	—	—	—
<b>Adequately informed about lockdown</b>								
No	0.21	0.121	1.24 (0.98–1.57)	0.079	0.33	0.133	1.39 (1.07–1.80)	0.014*
Yes*	—	—	—	—	—	—	—	—
<b>Source of information</b>								
Television or radio	−0.59	0.275	0.56 (0.32–0.95)	0.033*	−0.66	0.295	0.52 (0.29–0.92)	0.025*
Official government agencies	−0.76	0.286	0.51 (0.29–0.90)	0.020*	−0.44	0.301	0.64 (0.36–1.16)	0.141
A health care worker	−0.66	0.326	0.52 (0.27–0.98)	0.042*	−0.62	0.344	0.54 (0.28–1.06)	0.074
Social media	−0.39	0.255	0.68 (0.41–1.12)	0.131	−0.52	0.270	0.59 (0.35–1.01)	0.052
Conversation with other people*	—	—	—	—	—	—	—	—
<b>Enough food supply to withstand lockdown period</b>								
No	0.40	0.110	1.49 (1.20–1.85)	< 0.001*	0.67	0.122	1.96 (1.54–2.49)	< 0.001*
Yes*	—	—	—	—	—	—	—	—

<sup>#</sup>Reference category: Normal; \*Reference category (One NIS = 0.28 US Dollars).

OR, odds ratio; CI, confidence interval; SE, standard error.

Likelihood Ratio Test of the final model fitting significance was < 0.001. Pearson chi-square test for model goodness-of-fit significance was 0.397.

populations during COVID-19 pandemic. Stress and anxiety during the pandemic came from the uncertainty and wide-range of expectations of the future rather than infection rate (Palestine had a low number of COVID-19 cases and death at the time of the survey in comparison to these countries).

Inadequate food supply was found to be the only factor that positively associated with all degrees of both anxiety and stress. In our sample, 51% of respondents who reported inadequate food supply were also from low monthly income group, so whether inadequacy in food supply was a pre-existing condition or triggered recently by lockdown measures is unknown by our

cross-sectional study and needs further investigation. However, we do believe that low socio-economic status had affected the adequacy of food supply as these two factors are cross related at all levels mainly the economical and therefore the ability to afford food in the families. This is indeed could be supported by the finding that, people with low monthly income was found to be more likely to have a mild/moderate degree of stress compared to people with a high monthly income [OR (95%CI) = 1.41 (1.03–1.91)]. Further mechanism behind that could be explained by that many jobs were lost due to social distancing and lockdown measures, which added more to the financial loss of individuals



and society. In United Kingdom, Canada, and Korea, it was found that lost income and people with low monthly income were more likely to have anxiety and stress than people with a high monthly income during the same pandemic, during SARS 2003 and during MERS 2015 (Hawryluck et al., 2004; Jeong et al., 2016; Shevlin et al., 2020). A study in Bangladesh found a greater prevalence of sleep disturbance among participants who or anyone from their family members lost jobs during this pandemic, as losing jobs created massive insecurity of meeting livelihoods (Ara et al., 2020). A systematic review of different studies from 39 countries reported an estimated prevalence of sleep problems of 31% among healthcare professionals, 18% among the general population, and 57% among COVID-19 patients (Alimoradi et al., 2021). The most possible explanation and mechanism of this relationship may be explained by the economic stress disseminated all over the countries during lockdown where low monthly income group would be the most vulnerable. It is worth mentioning that Palestine is classified as a middle low-income country and has a low socio-economic status (World Bank, 2021). However, a study on six Arabic countries nearby Palestine found that no differences were noted in rates of anxiety or stress between low-income countries and high-income countries (Al Omari et al., 2020).

Age showed an inverse relationship with stress severity, but not anxiety. A systematic review of 43 large studies concluded that anxiety was consistently associated with younger age (Santabábara et al., 2021b). Two studies in Spain (González-Sanguino et al., 2020) and Northern Spain (Ozamiz-Etxebarria et al., 2020) found that the younger participants were more likely to have both stress and anxiety. An Italian study concluded that age and anxiety, but not stress, had an inverse relationship (Mazza et al., 2020). However, a Chinese study found that age was not associated with anxiety or stress level (Wang et al., 2020). All of these studies were held during the same pandemic and used the DASS-21 scale. According to the Palestinian Central Bureau of Statistics (PCBS), 66.3% of the Palestinians in 2020 were younger than 29 years old, so Palestinian society has a very young age structure, as reflected in this study (PCBS, 2021a). As the vast majority of the Palestinian population is young they could be more vulnerable to stress and anxiety due to lockdown measures. Usually young population spend more time outdoor and this lockdown could have significant impact on their psychological health. Moreover, during the lockdown, college and university students shifted to an online learning platforms, this might have been associated with increased stress and anxiety (UNESCO, 2021). Lockdown measures also limited job prospects for the large portion of newly graduated students which might explain the higher levels of stress among younger adults in our study. This is in accordance to some other studies where a systematic review of different studies from four countries showed that fear of COVID-19 was associated with increased future career anxiety and perceived job insecurity (Rajabimajid et al., 2021).

In this study, females were more likely to have mild/moderate degree of anxiety and both mild/moderate and severe/extremely severe degrees of stress compared to males. A systematic review of 43 studies during COVID-19 found a significantly higher anxiety levels in women, this could be explained and justified by the

differences in brain chemistry, women are usually caregivers, and thus had a reduced ability to perform their work (Santabábara et al., 2021b). Similar findings came from United Kingdom regarding anxiety (Shevlin et al., 2020). Other studies during COVID-19 did not find a difference between females and males (Hu et al., 2020). A Chinese study (Wang et al., 2020), an Italian study (Mazza et al., 2020), and an Arabic study (Al Omari et al., 2020) found that females were more likely to have both anxiety and stress during the same pandemic. Another study in Bangladesh found a higher prevalence of sleep disturbance and anxiety among women (Ara et al., 2020). A Jordanian study found that female gender was significantly associated with high level of distress (Khatatbeh et al., 2021). Another possible explanation and mechanism behind this relationship could be that anxiety and stress during the pandemic beat cultural differences, as different types of societies represent the same results. In the Palestinian society at least, there is a patriarchal notion that women's loyalty mostly lies with their home duties and their families (ReliefWeb, 2020). According to a 2017 study in Palestine, 80% of men and 60% of women believe a woman's most important role is home-care (ReliefWeb, 2020). Consequently, home confinement may have increased household responsibilities, which may disproportionately affect Palestinian women (ReliefWeb, 2020). A report by UN Women found that 76% of women had lost their income (compared to 65% men) (UN Women, 2021).

Cohabitation with someone at the high-risk group was a significant predictor of both anxiety and stress. This relationship could be due to the fear of losing them, as this condition makes them vulnerable to the more devastating association of the COVID-19 virus. On one hand, a significant association was noticed between cohabitation with someone at the high-risk group and the adherence to in-home precautions in our population, most probably in an attempt to protect them from the virus. The delay in medical supplies including necessary medication to the high-risk group, during the COVID-19 pandemic could also have a role (, 0000) and forcing this particular group to fight against multiple stressors.

People who reported knowing cases confirmed with COVID-19 were more likely to have both mild/moderate and severe/extremely severe degrees of anxiety. This is consistent with other studies from Spain and Italy (Hawryluck et al., 2004; Rodríguez-Rey et al., 2020). People who reported fear of getting COVID-19 or transmitting it was more likely to have a mild/moderate degree of both anxiety and stress compared to people who didn't report the same feelings. This is also noted in studies conducted on different countries (Barzilay et al., 2020; Lei et al., 2020; Upadhyay et al., 2020). The same was observed in a meta-analysis pooled data from 91 studies with 88 320 participants from 36 countries that showed associations between fear of COVID-19 and mental health-related factors were mostly moderate (Fisher's  $z$  was 0.54 for anxiety and 0.42 for stress) (Alimoradi et al., 2022).

Respondents who expressed being adequately informed about lockdown measures were less anxious and distressed compared to those who complained of having inadequate information. This is consistent with other studies (Sim et al., 2010; Wang et al., 2020).

Working in jobs that required going outside the home (e.g., health care workers, police officers etc.) was found to be a significant predictive factor of anxiety. Being the frontline fighters, healthcare workers were also more likely to develop anxiety due to fears of becoming infected or transmitting the infection to others (Dubey et al., 2020). The lockdown aimed to decrease interactions between people, to avoid the spread of infection, and to make contact tracing easier as new cases stem outside sources during work and are then transmitted to a household member.

It is worth mentioning that in our study educational level had no impact on anxiety or stress severity in multivariate analysis. Similarly, a Bangladeshi study found no association between educational level and stress or anxiety (Ara et al., 2020). In another Italian study, it was noted that people with higher educational levels were more likely to have stress compared to people with low educational levels (Mazza et al., 2020). Interestingly, an Egyptian study found that university students have a higher degree of stress more than non-educated and highly-educated people (El-Zoghby et al., 2020). In Palestine, this relationship between the educational level and the level of anxiety and stress, could be explained by that an advanced educational level does not guarantee a job. According to the Palestinian Central Bureau of Statistics (PCBS) in 2018, the unemployment rate rose to 58% among graduates aged 20–29 years (PCBS, 2021a). In Palestine, however, most new graduates are entering the workforce for the first time after completing their education (, 0000). Therefore, the educated individuals in the Palestinian society could not have a lot of worries so their level of stress and anxiety might have not been affected by the lockdown as they used to this situation.

This study is limited by the sampling technique, which may have introduced selection bias. Importantly, 78% of participants were females which might over-estimate the stress and anxiety severity and therefore our anxiety and stress rates should be interpreted with caution. Furthermore, due to social distancing during the lockdown, we disseminated the survey on social media and this might in part exclude people who didn't have access to the internet and social media. Meanwhile, this was the only possible procedure during the lockdown with faster and safer collection of the required information.

This study was a cross-sectional web-based survey and therefore data can't be used to infer causality because temporality is not known, recall and/or systematic bias were also possible. Furthermore, over and/or under-estimation of some measures might have been occurred. However, it should be noted that this study has several strengths including a large sample size and the sampling timeframe that corresponded to the peak surge of COVID-19 cases in Palestine (COVID-19, 2022).

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## CONCLUSION

We reported high rates of anxiety and stress and different predictors of their severities among the Palestinian general population during COVID-19 lockdown. Certain key groups who might be more vulnerable to COVID-19 lockdown measures were identified. Particularly, those with had low socioeconomic status, younger and female.

Implications of these findings include better management of the pandemic and alternative approaches to address the socioeconomic inequalities, given their impact on the psychological health of the population. This involves changing policies, providing alternative economical sources for those who are in-need, and spreading more awareness regarding the pandemic. Current and future response-plans need to take into account the psychological burdens of pandemics and how to mitigate them. This is crucial as communities move forward and begin to emerge from COVID-19 crisis. Further research is needed to track whether these vulnerable groups show higher levels of psychological impacts at later stages of the pandemic.

## DATA AVAILABILITY STATEMENT

The original contributions presented in this 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 An-Najah National University IRB Committee. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

HA, MH-Y, NY, and TA designed study protocol and drafted the manuscript. HA coordinated the study protocol and conducted the statistical analysis. MH-Y, NY, and TA collected the data. All authors read and approved the final manuscript.

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# Self-Care and Mental Health Among College Students During the COVID-19 Pandemic: Social and Physical Environment Features of Interactions Which Impact Meaningfulness and Mitigate Loneliness

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The COVID-19 pandemic has interrupted patterns and limited opportunities for social interaction, which increased already high loneliness rates among college students. Meaningful social interactions can mitigate negative mental health outcomes such as loneliness and bolster social support, which is in turn linked to better self-care practices. Social connection can aid in self-care through social support as well as be considered a self-care practice itself to counter the negative effects of loneliness. This study examined the social interaction patterns of 132 college students from a mid-sized United States university during the pandemic to understand which characteristics support meaningful interactions. Students completed an online survey from October through December 2020 to report details of their 2020 and 2019 social interactions, as well as their most recent interactions, including time spent, the mode (in-person versus virtual), their relationship to others in the interaction, the type of activity and privacy of the setting. Results found that students spent significantly less time interacting with non-roommates in-person in 2020, and more time in voice and video calls. No differences were found for texting and in-person roommate interactions. Meaningfulness was significantly higher for interactions with family or friends. Students reported the highest meaning for interactions that were planned and in-person, with lowest meaning for planned virtual interactions. No differences were observed for meaningfulness based on the type of interaction activity or privacy of the setting. Understanding the characteristics of the most meaningful interactions can help college students prioritize social interactions that may best promote self-care, mitigate loneliness, and bolster social support. High meaningfulness scores for planned in-person interactions suggests that these types of interactions may be most valuable for maintaining existing self-care patterns, engaging in self-care activities, and receiving support. Self-care activities for college students, including social interactions, were significantly impacted by the COVID-19 pandemic,



which may have further exacerbated loneliness. College students should be encouraged to consciously engage in person with family and friends to practice self-care and maintain or improve mental health. Strategically selecting interactions that will optimize meaningfulness may therefore be critical to helping students to maintain positive mental health during and beyond the pandemic.

**Keywords: social interaction, self-care, loneliness, mental health, college students, physical environment, virtual interactions, COVID-19 pandemic**

## INTRODUCTION

Scholars have been examining a rise in reported loneliness, especially among young adults, even before the beginning of the COVID-19 pandemic (Twenge et al., 2021). Social distancing restrictions and stay-at-home orders that accompanied the pandemic have only exacerbated feelings of loneliness for many (Groarke et al., 2020; Killgore et al., 2020). One of the reasons for the increase in loneliness is likely the decrease in social interactions, especially those occurring in-person, as pandemic-induced shifts in community expectations and social behaviors have been accompanied by a significant transfer to online learning, working, and socializing.

Loneliness, a feeling of inadequate social interaction or fulfilling relationships (Russell et al., 1980; Masi et al., 2011), has received growing attention in the last few decades from scholars, journalists, and governments, with media reports of loneliness becoming ubiquitous. Research has linked loneliness to a myriad of negative physical and mental health conditions, including cardiovascular disease (Hawkey and Cacioppo, 2010; Valtorta et al., 2016; Xia and Li, 2018), poor sleep quality (Cacioppo et al., 2002; Segrin and Passalacqua, 2010), depression (Cacioppo et al., 2006; Killgore et al., 2020), lower immune functioning (Kiecolt-Glaser et al., 2010; Xia and Li, 2018), and premature mortality (Hawkey and Cacioppo, 2010; Shiovitz-Ezra and Ayalon, 2010; Holt-Lunstad et al., 2015; Christensen et al., 2020). In addition to being tied to numerous negative health outcomes, loneliness feeds a lack of interest and ability to participate in positive health behaviors (Segrin and Passalacqua, 2010), including maintaining important self-care practices in daily routines that positively influence health and well-being (Narasimhan et al., 2019). Due to its embeddedness in a complex web of sociocultural and environmental factors, as well as individual characteristics, it can be difficult to fully understand underlying factors that contribute to loneliness (Masi et al., 2011).

Untangling the variables linked to loneliness can be additionally challenging when looking at individuals under the age of 30, as during the shift from adolescence to adulthood that are simultaneously navigating a complex world of shifting societal expectations, identity, responsibilities, social ties, and often residence (Shaver et al., 1985; Arnett et al., 2014). The transition between life phases, often highlighted by the move from high school into college, can leave young adults especially vulnerable to experiencing loneliness, with young adults between the ages of 18 and 22 reporting some of the highest rates of loneliness (Renken, 2020). These feelings can interplay with other mental health concerns, such as anxiety, and could

interfere with the formation of social bonds and the development of healthy practices important for long-term happiness and health (Moore and Schultz, 1983; Mahon et al., 1998). Even though these changes in networks, activities, and physical and social spaces which young adults inhabit contribute to increased difficulty in pinpointing factors associated with loneliness, it is nevertheless vital for research to untangle and identify factors which could be targeted for interventions to help mitigate this experience.

Among several types of interventions identified in a meta-analysis of studies aimed at reducing loneliness, Masi et al. (2011) found that improving social support and increasing social interaction opportunities could be viable mechanisms for achieving this outcome. Considering the critical role of social interaction in building and enhancing social support, understanding patterns and characteristics of social interactions could help individuals create strategies for improving both social support and reducing loneliness. Social interaction is theorized to have a bi-directional relationship with loneliness, such that it is influenced by and in turn shapes social interactions (Nowland et al., 2018).

One pathway for influencing social interaction to mitigate loneliness is through promoting self-care, broadly defined as the engagement in activities that foster health and well-being, including sleep, medication adherence, and meditation (Richard and Shea, 2011; Myers et al., 2012). Self-care practices are directly and indirectly related to both social interaction and social support. Although research in this field focuses primarily to self-care in post-operative contexts, studies have found that a greater amount of social support has been linked to better self-care practices (Gallant, 2003; Vassilev et al., 2011; Chen et al., 2017). For example, individuals undergoing pulmonary rehabilitation engaged in better self-care behaviors if they had higher amounts of social support, specifically positive social interactions (Chen et al., 2017). Social interaction can influence self-care practice through encouragement from one's social support network to employ in better self-care practices and strategies (e.g., Chen et al., 2017). Social interaction may also influence self-care more directly, when examined as a type of self-care practice, although evidence in this research area is limited. More specifically, social interaction is an activity for maintaining both physical health and emotional well-being (e.g., hampering loneliness), especially when social interactions envelop activities that directly promote health outcomes (e.g., exercise; healthy eating).

Promoting or providing the conditions conducive to social interactions may therefore be a viable mechanism to counteract the negative effects of loneliness. Although both the quantity and

quality of social interactions are likely to have positive impacts on health and well-being (Fiorillo and Sabatini, 2011; Lodder et al., 2015; Luhmann and Hawkey, 2016; Sun et al., 2020), higher quality interactions are more effective in promoting positive outcomes (Luhmann and Hawkey, 2016). While an examination of the quality of interactions can be operationalized in different ways, the current study assesses quality through meaningfulness, or how meaningful an interaction is to an individual, as this variable has been found to predict loneliness (Wheeler et al., 1983). Meaningful social interactions, therefore, may impact loneliness by directly reducing lonely feelings, by helping build social support networks that can mitigate loneliness (Masi et al., 2011), and by providing self-care strategies that could counteract the negative mental and physical effects of loneliness.

The pandemic has limited social interaction opportunities and interrupted daily interaction patterns for millions of individuals around the globe. College students have been disproportionately impacted, as many students were asked to leave their campus housing and move back to their family homes, often in a different city. During most of the year 2020, places for interacting in-person with peers, mentors, and faculty members, especially on-campus and indoor public spaces, were not accessible to most college students and many classes were held virtually. This interruption undoubtedly impacted existing coping and self-care strategies that college students utilized, leading to increases in loneliness during the pandemic (Killgore et al., 2020). As the pandemic shifts to an endemic, and many restrictions related to social interactions remain, it is important that we examine the types and conditions of social interactions which were meaningful for college students during the pandemic to understand how we can support the interactions which can promote self-caring, improve social support, and mitigate loneliness during and beyond the COVID-19 pandemic.

In examining college students' social interactions, we hypothesized that higher meaningfulness would be associated with interactions that (1) included family and friends; (2) occurred in-person as opposed to virtually, and (3) were planned in advance as compared to interactions that are spontaneous. We also anticipated that meaningfulness would be higher when interaction activities were leisurely in nature when compared to work- or study-related interactions, or a mix of both activity types. Meaningfulness was also expected to be significantly different based on the characteristics of the environmental setting in which it occurred, including the type of space and the privacy level provided by the setting.

## MATERIALS AND METHODS

Undergraduate and graduate students at a mid-sized university in the northeastern United States were recruited to participate in a study examining social interactions patterns among college students during the COVID-19 pandemic. A questionnaire was administered online from October 2020 through December 2020; eligible participants were able to complete the survey at any time during the study period. While many of the students had returned to the university's community for the Fall 2020 semester, the

majority of classes were held virtually. If students spent time on campus, they were required to adhere to strict pandemic guidelines, including 6-foot distancing, limiting room occupancy, and wearing masks.

The questionnaire took approximately 25 min to complete. Participants were asked to report answer questions related to their demographics, personality type (Big 5 personality traits; Gosling et al., 2003), and location at which they were currently residing. Participants also reported details related to their interactions from the past week, including specific features of their most recent interaction. They were also asked to complete measures of place attachment (Lewicka, 2008) and social support (Sarason et al., 1987).

## Loneliness

Loneliness was measured using the 20-item UCLA Loneliness Scale (Russell et al., 1980). Three questions of the twenty have been identified as an adequate short-form measure for loneliness (Hughes et al., 2004). Due to missing data for the full 20-item measure, Multiple Imputation ( $m = 10$ ) was used to derive scores for participants that had completed more than 60% of the 20-item measure. Imputed responses to the three questions of the short-form measure were utilized as the measure for loneliness in this study. Participants with randomly missing data for any of the other variables were removed from analysis only for the individual tests where their response was missing.

## Year-by-Year Interactions

A set of questions asked for the amount of time, in hours, that participants spent in various kinds of interactions on an average day the previous week (Fall, 2020), separating out interactions taking place via instant messaging, voice calls, video calls, in-person with roommates or housemates (called roommates, in this study), and in-person with individuals that do not live with them. Students were asked to recall the time spent in each type of interaction during a typical week. This set the year prior (Fall, 2019) before the emergence of the pandemic. In addition, the survey asked participants to identify three physical places in which most of their in-person interactions occurred both in the previous week and a typical week a year prior.

## Social Interaction Meaningfulness

The quality of recent social interactions was assessed by examining self-reported meaningfulness, using five dimensions (self-disclosure, other-disclosure, intimacy, meaning, satisfaction) of the Rochester Interaction Record (RIR) which have been used previously as a measure for how meaningful an interaction was (Wheeler et al., 1983). This scale was altered slightly to account for modern meanings of the measure's original language (e.g., *meaningfulness* used instead of *intimacy*). Students rated the meaningfulness of (1) "a typical interaction with your friends or peers last week" and (2) their most recent interaction.

## Details of Most Recent Interaction

For their most recent interaction, participants were asked to include additional details, including whether it occurred in a

private or public space (i.e., “privacy”), if it was in-person or virtual (i.e., “mode”), their relationship to each person in the interaction (i.e., “relationship”), and if the interaction had been scheduled in advance or was spontaneous (i.e., “planned”). Additionally, they were asked to report every type of activity that was part of the interaction (i.e., “activity”; e.g., eating, working).

The study and its survey tool were approved by the Institutional Review Board of the participating university, with participants providing informed written consent prior to participating in the study.

## RESULTS

The survey was completed by 132 college students with an average age of 21 years ( $SD = 3.88$  years), the majority of whom were female (80%) and lived at the time in the same state as the university (84%) (see **Table 1** for participant demographics). Of those students who had returned to the city, most lived off-campus in a range of housing types.

When asked to list the total number of individuals that they could turn to provide social support participants reported an average of 6 people. Participants indicated a moderately high level of satisfaction with the amount of social support in their lives (**Table 2**). Feelings of loneliness among participating students were relatively high, with a mean score of 7.79 on a scale of three (low loneliness) to twelve (high loneliness). A Pearson’s product moment correlation found a significant negative correlation between age and loneliness [ $r = -0.29$ ,  $t(97) = -3.01$ ,  $p = 0.003$ ], but no significant correlation between years of education at the university and loneliness [ $r = -0.11$ ,  $t(97) = -1.14$ ,  $p = 0.26$ ]. The correlation between loneliness and meaningfulness of a typical interaction last week approached significance [ $r = -0.26$ ,  $t(46) = -1.81$ ,  $p = 0.08$ ], and a significant correlation emerged when examining loneliness and meaningfulness of the most recent interaction [ $r = -0.35$ ,  $t(52) = -2.67$ ,  $p = 0.01$ ].

*T*-tests found that, in 2020, participants spent significantly more time [ $x = 1.87$  h,  $t(128) = 7.22$ ,  $p < 0.001$ ] interacting in-person in than they did via video calls, when including both interactions with those that they lived with and individuals outside of the home (see **Tables 3, 4**). Hours spent in interactions with housemates or roommates on an average day did not differ significantly between 2020 and 2019 [ $x = -0.05$ ,  $t(129) = -0.28$ ,  $p = 0.78$ ]. However, students spent significantly less time interacting in-person with people other than house/roommates in 2020 [ $x = 1.25$ ,  $t(127) = 6.97$ ,  $p < 0.001$ ] than the same time the previous year. Examinations of year-by-year interactions mediated by technology found no significant differences in the hours spent instant messaging per day [ $x = -0.001$ ,  $t(129) = -0.01$ ,  $p = 0.99$ ], while participants did spend significantly more time interacting in 2020 over voice [ $x = 0.31$ ,  $t(128) = 3.56$ ,  $p < 0.001$ ] and video call [ $x = 0.82$ ,  $t(128) = 0.61$ ,  $p < 0.001$ ] than they did the year prior. Examination of students’ three most common spaces for in-person interactions in 2020 and 2019 found a large reduction in the reported use of on-campus indoor spaces, a moderate increase in the use of the majority of outdoor spaces, and a large uptick in the use of

**TABLE 1 |** Demographic variables.

Category	#	%
<b>Gender</b>		
Female	106	80.3
Male	24	18.2
Other	2	1.5
<b>Age</b>		
18	24	18.0
19	27	20.5
20	28	21.2
21	23	17.4
22	4	3.0
23	4	3.0
24	3	2.3
25	3	2.3
26	0	0.0
27	2	1.5
28	4	3.0
29	1	0.8
30	2	1.5
31	1	0.8
32	1	0.8
33	2	1.5
34	2	1.5
35	1	0.8
<b>Years at this University</b>		
1	35	26.5
2	39	29.6
3	31	23.5
4	23	17.4
5	2	1.5
>5	2	1.5
<b>Current place of living</b>		
<b>Number of people live with</b>		
0	27	20.5
1	37	28.0
2	21	15.9
3	14	10.6
4	16	12.1
5	8	6.1
6–10	5	3.8
>10	3	2.3
Unknown	1	0.8
<b>Relationship to people living with</b>		
Alone	27	20.5
With significant other	7	5.3
With family	28	21.2
With roommates	22	16.7
With housemates	56	42.4
<b>Location: Country/State</b>		
In state	111	84.1
In United States not in state	14	10.6
Not United States	7	5.3

(Continued)

**TABLE 1 |** (Continued)

Category	#	%
<b>Location: For participants in state</b>		
In the city	101	91.0
≤60 miles from city	1	1.0
>60 miles from city	9	8.9
<b>Location: Relative to campus</b>		
On campus	37	36.6
Off campus	64	63.4
<b>Residence type</b>		
Dorm	35	26.5
Single	28	21.2
Duplex	8	6.1
Multi ≤4 floors	36	27.3
Multi >5 floors	20	15.2
Other	4	3.0
NA	1	0.8
<b>Years lived there</b>		
<1	79	59.9
1 to <2	20	15.2
2 to <3	6	4.6
3 to <4	2	1.5
4 to <5	0	0.0
5 to <10	2	1.5
10 to <15	4	3.0
15+	14	10.6
Unknown	5	3.8
<b>Do you consider this “home?”</b>		
I don't know	1	0.8
Definitely	42	31.8
Somewhat	70	53.0
Not at all	19	14
<b>Is this your permanent residence?</b>		
Yes	35	26.5
No	96	72.7
Unknown	1	0.8
<b>Total</b>	<b>132</b>	

**TABLE 2 |** Social support and loneliness.

	Range available	<i>M</i>	<i>SD</i>
Average # of people providing social support	Open: no cap	5.66	4.24
Satisfaction	1 (high) to 6 (low)	2.22	1.03
Feelings of loneliness	3 (low) to 12 (high)	7.79	2.45

*M*, Mean; *SD*, Standard Deviation.

residential spaces during the pandemic, with similar trends for all participants and when first-year students are excluded from the analysis (Figure 1).

## Most Recent Interaction

A two-sample *t*-test found that participants reported significantly higher meaningfulness [ $t(66) = -2.42, p = 0.018$ ] for interactions that were with family members and/or friends ( $M = 25.56$ )

compared to those not including family or friends ( $M = 20.23$ ) (see Figure 2 and Table 5). A  $2 \times 2$  analysis of variance (ANOVA) found a significant main effect for mode of the interaction on meaningfulness [ $F(1,65) = 10.21, p = 0.002$ ], and a significant main effect of whether the interaction was planned [ $F(1,65) = 4.70, p = 0.03$ ; Table 6]. Examination of the significant mode by planning interaction effect [ $F(1,65) = 6.49, p = 0.01$ ] found that virtual interactions that were planned had the lowest meaningfulness scores ( $M = 20.0$ ) and scores for planned interactions in-person had the highest meaning ( $M = 28.9$ ), with scores for unplanned interactions falling between the two ( $M_{\text{in-person}} = 25.5, M_{\text{virtual}} = 23.8$ ) (see Table 7).

A one-way ANOVA found no significant differences [ $F(2,66) = 1.70, p = 0.19$ ] in reported meaningfulness based on the nature of the activity occurring during the interaction (i.e., leisurely, focused, or a mix of both) (see Table 6 and Figures 3, 4). A two-sample *t*-test found no significant differences [ $t(38.15) = 0.87, p = 0.42$ ] for meaningfulness between interactions occurring in private ( $M = 23.94$ ) or public settings ( $M = 25.58$ ) (Table 5).

An ANOVA examining the types of spaces in which both virtual and in-person interactions occurred found no significant differences in meaningfulness of the interaction [ $F(11,57) = 0.95, p = 0.50$ ; Table 6]. However, there were large differences between the total number of interactions that occurred within each space type (e.g.,  $n_{\text{bedroom}} = 34, n_{\text{library}} = 1$ ; see Figure 5).

## DISCUSSION

The COVID-19 pandemic altered the lives and routines of individuals all over the globe. This study demonstrates that the pandemic also had profound impacts on daily social interaction

**TABLE 3 |** *T*-tests of time spent interacting between 2019 vs. 2020.

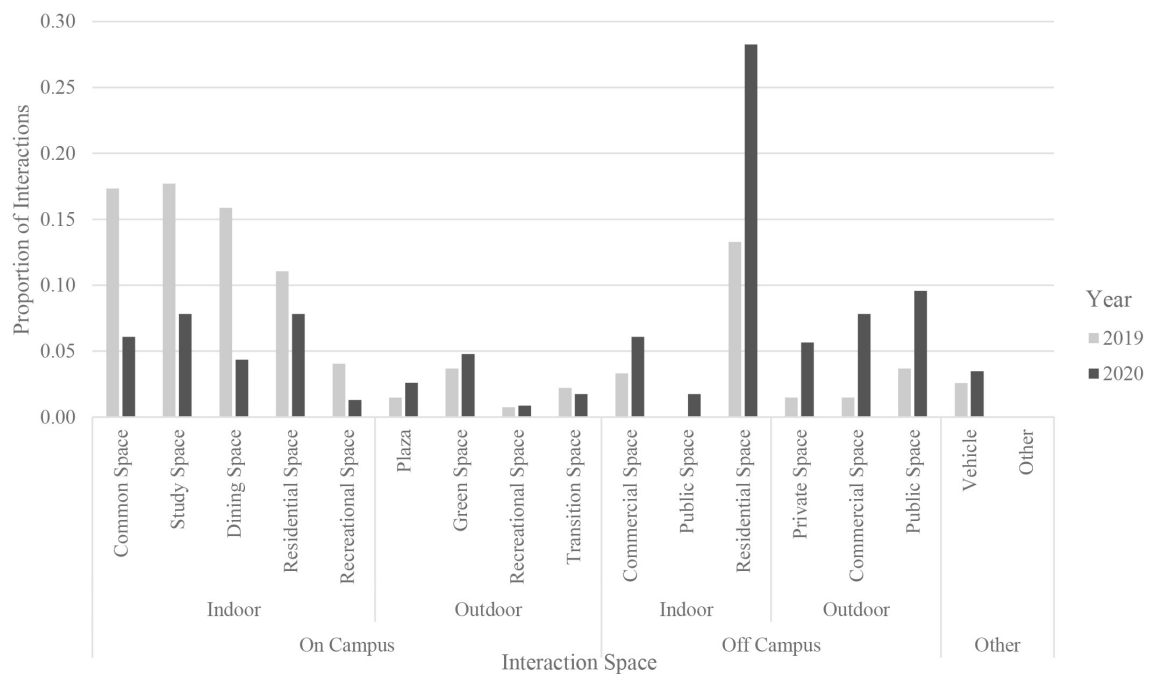
Interaction activity	Estimate	<i>t</i>	df	<i>p</i> -value	95% CIs
In-person with housemates	−0.05	−0.28	129	0.78	(−0.41, 0.30)
In-person with others	1.25	6.97	127	<0.001**	(0.90, 1.61)
Via voice call	−0.31	−3.56	128	<0.001**	(−0.48, −0.14)
Via video call	−0.82	−0.61	128	<0.001**	(−1.08, −0.55)
Via messaging	−0.001	−0.01	129	0.99	(−0.26, 0.26)

\*\* $p < 0.01$ .

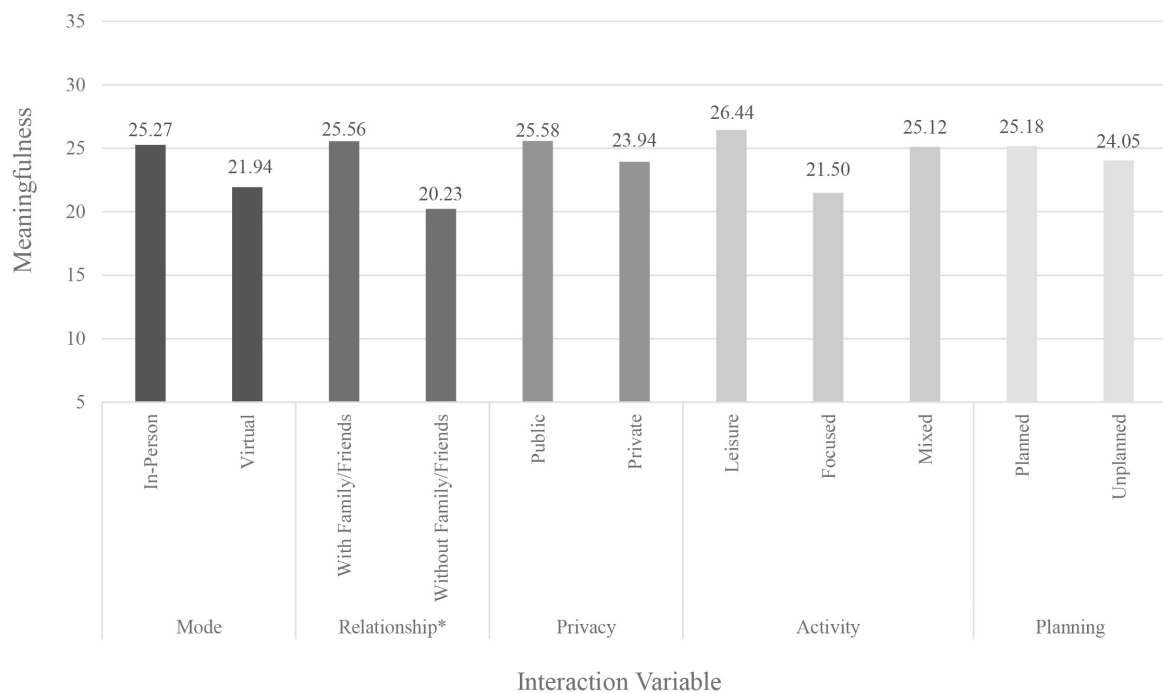
**TABLE 4 |** Average hours per day spent interacting in 2019 vs. 2020.

Interaction activity	2019		2020	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
In-person total	4.71	2.84	3.48	2.77
In-person with housemates	1.85	1.94	1.90	1.99
In-person with others	2.83	1.77	1.59	1.71
Via voice call	0.57	0.88	0.86	1.17
Via video call	0.75	0.92	1.57	1.55
Via messaging	1.83	1.51	1.83	1.59

*M*, Mean; *SD*, Standard Deviation.



**FIGURE 1 |** Proportion of in-person interactions in three most common spaces, excluding first year students.



**FIGURE 2 |** Mean score for loneliness by interaction variable. \*Represents  $p < 0.05$  when variable tested independently.

patterns among college students, mirroring patterns of reduced social contact found in a recent meta-analysis (Liu et al., 2021), but contrasting a finding of no differences in the amount of time spent interacting after the implementation of restrictions early

in the COVID-19 pandemic (Fried et al., 2022). Participating students spent significantly less time in face-to-face interactions with individuals other than roommates, and more time spent on voice and video calls. These changes are not surprising given



**TABLE 5 |** *T*-tests of meaningfulness by relationship to person/people and privacy level.

			<i>t</i>	<i>df</i>	<i>p</i> -value	95% CIs
Relationship	<i>With family/friends</i>	<i>Non-family/friends</i>				
	25.56	20.23	−2.42	66	0.02*	(−9.73, −0.94)
Privacy	<i>Public</i>	<i>Private</i>				
	25.58	23.94	0.82	66	0.42	(−2.38, 5.66)

\**p* < 0.05.

the physical distancing measures and limits to amount of social contact that were in place, and often mandated, in order to limit the spread of COVID-19 (Sen-Crowe et al., 2020). Time spent the year prior on in-person interactions such as class, work, and socializing with friends was supplanted, although not entirely, with time spent interacting virtually. Even with the increase in time spent in video calls, the overall time that students spent in 2020 interacting with others in-person was still greater than the time spent interacting over video calls, despite the significant drop in in-person interactions with non-roommates. However, these year-to-year reductions in in-person interactions account for over an hour a day of lost time spent interacting in-person. Considering the substantial shift from in-person to video/voice calls, and the care with which individuals had to select with whom and where they would interact in-person during the pandemic, it is vital to examine the aspects of interactions that could be important for facilitating positive well-being and opportunities for self-care during continuing restrictions and beyond. College students face significant barriers to high-quality social interactions even outside the pandemic, as they navigate stressful and often busy schedules and must be selective when deciding how, and with whom, to spend their time. Therefore, determining which components of interactions are linked to higher meaningfulness can help inform individuals when making interaction decisions, as well as the provision of spaces which support meaningful interactions. Some physical spaces that were traditionally reserved for specific kinds of interactions, such as the use of classrooms for instruction, were completely abandoned during the height of the pandemic. Other spaces, especially those often designated for private life and restoration, were invaded by different types of virtual interactions (e.g., bedrooms and living rooms became places to attend virtual classes and meetings). We can see this through in shifts toward interactions inside the home in 2020 compared to 2019. When considering spaces related to self-care practices (e.g., nail salons, recreational spaces) and those in which social interactions and self-care activities often take place (e.g., restaurants), many of these settings were either highly restricted or unavailable altogether (Storr et al., 2021). In this way, the lack of availability of activities and spaces which can be used for self-care practices necessitated a shift toward other types of activities or different spaces in which regular self-care activities could take place.

Meaningful interactions, those that can contribute to positive self-care, stronger social ties, and lower loneliness, were linked to some specific interaction features in this study. The differences in meaningfulness of almost 30% between planned virtual and planned in-person interactions relate to the fact that

most of the planned virtual interactions were for work- or study-related activities and the majority of planned in-person interactions constituted social engagements and more leisurely activities. The results here indicate that planned in-person interactions could be vital for maintaining existing self-care patterns, engaging in self-care activities (e.g., taking walks), and receiving the kinds of support and attention that are not available to the same extent when interacting virtually. While the low percentage of focused interactions occurring in-person is likely linked to pandemic-related restrictions, such a large proportion of leisure activities taking place in-person and not virtually is likely not just due individuals avoiding Zoom fatigue (Fauville et al., 2021) but hints at the importance of interaction characteristics and experiences available only when interactions are in-person. Though work examining different modes of face-to-face interactions is limited, some scholars suggest that physical co-presence plays a role in the perceptions of the interaction (e.g., Schroeder, 2002) and work in physical propinquity has found ties to social interaction opportunities and the formation of friendships (Nahemow and Lawton, 1975). Although previous research has found that online interactions

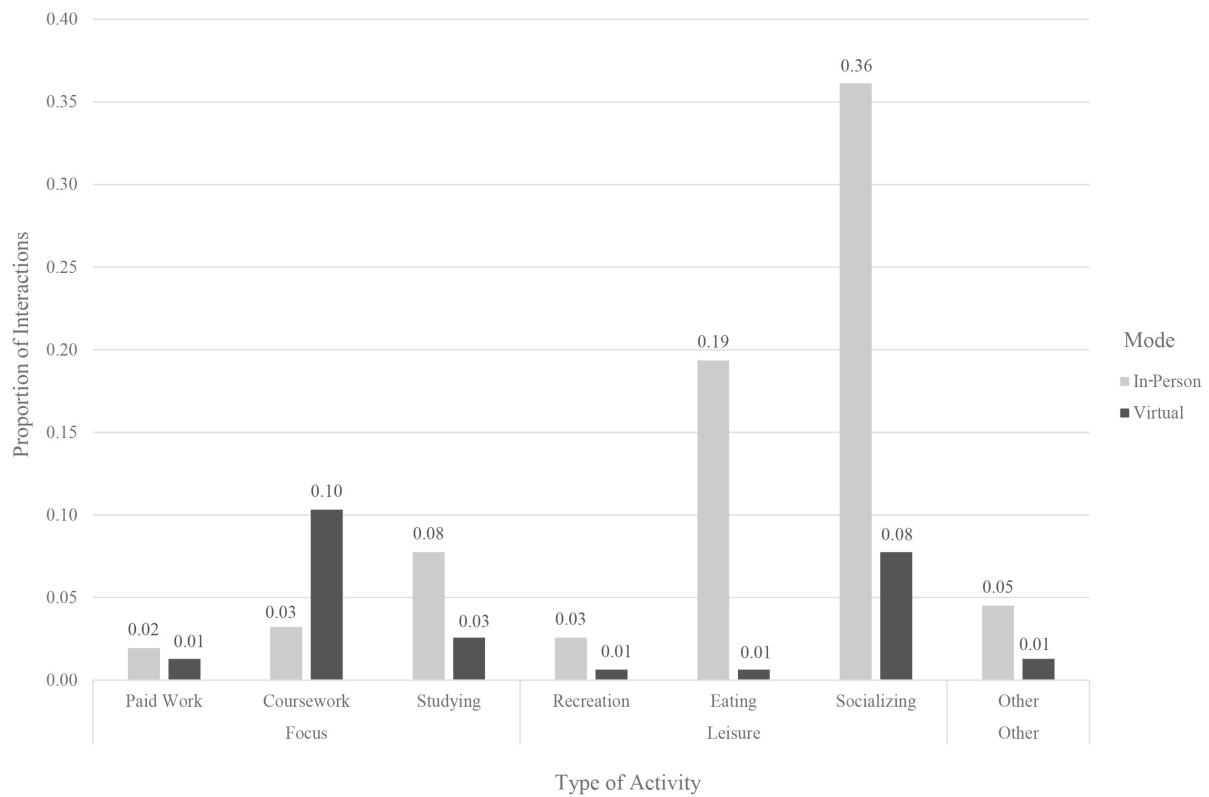
**TABLE 6 |** Two-way ANOVA for meaningfulness.

	<i>SS</i>	<i>df</i>	<i>F</i>	<i>p</i> -value
Planning	229.3	1	4.7	0.03*
Mode	498.9	1	10.21	0.002**
Mode × Planning	317.2	1	6.49	0.01*
<i>Residuals</i>	3174.9	65		
Activity type	180.2	2	1.7	0.19
<i>Residuals</i>	3436.3	66		
Building type	575.9	11	0.95	0.50
<i>Residuals</i>	3131.2	57		

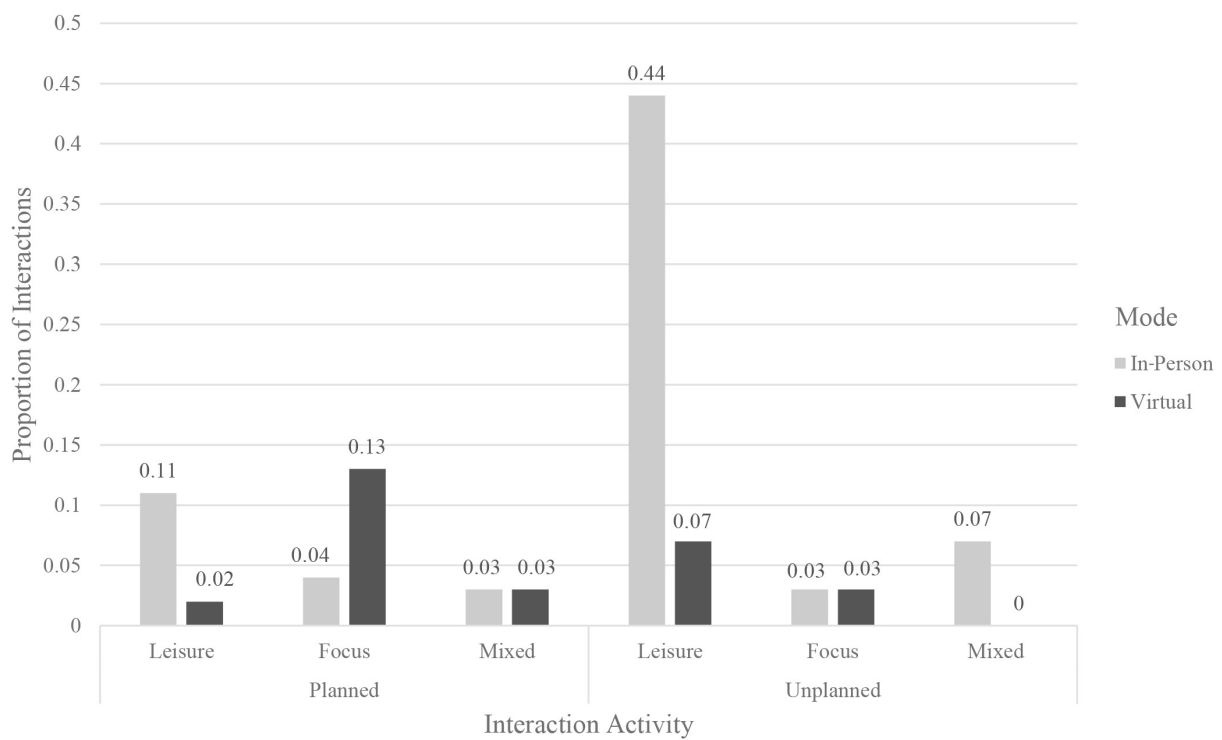
\**p* < 0.05, \*\**p* < 0.01.**TABLE 7 |** Simple main effects on meaningfulness for planning by mode.

Interaction	<i>M</i>	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i> -value	95% CIs
<i>Virtual</i>						
Planned	20.0	2.11	65	9.49	<0.001**	(15.8, 24.2)
Unplanned	25.5	2.85	65	8.94	<0.001**	(19.8, 31.2)
<i>In-person</i>						
Planned	28.9	1.8	65	16.00	<0.001**	(25.3, 32.5)
Unplanned	23.8	1.15	65	20.72	<0.001**	(21.5, 26.1)

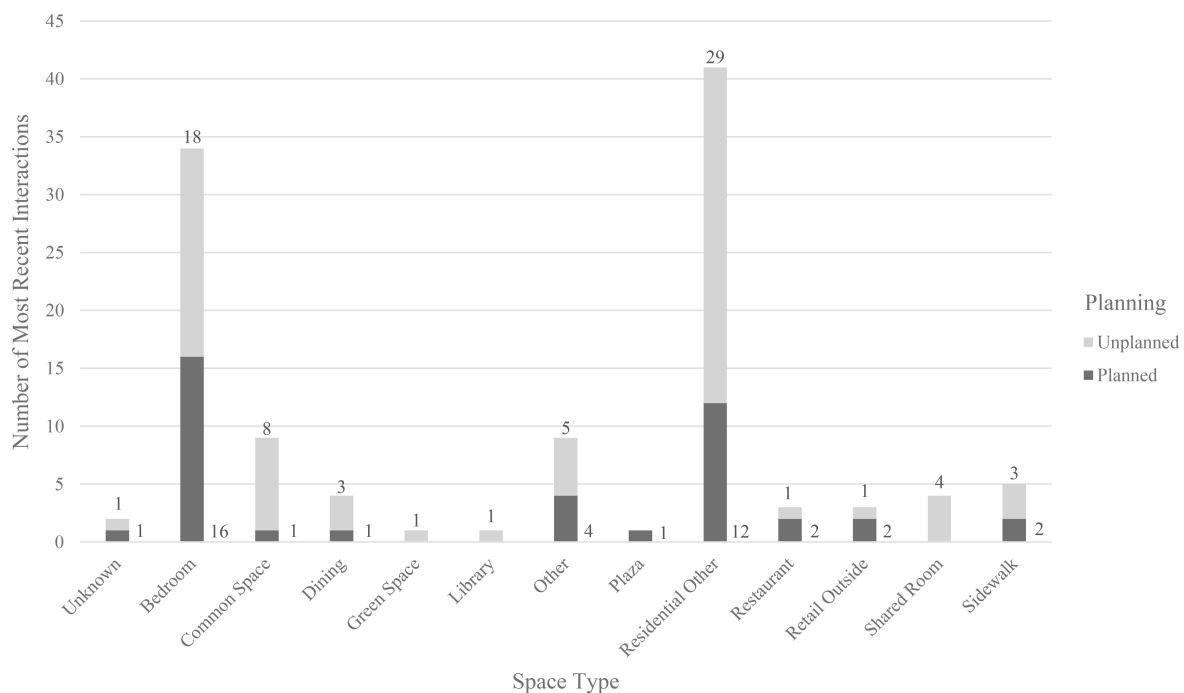
\*\**p* < 0.01.



**FIGURE 3 |** Proportion of type of activity occurring during interaction.



**FIGURE 4 |** Proportion of types of interactions, by mode and planning.



**FIGURE 5 |** Number of total interactions, by space type and planning.

can also provide social support in ways that promote better well-being (Canale et al., 2021), current technological advancements allow only limited opportunities for engaging in fulfilling self-care activities in the virtual sphere, as compared to those afforded by a physical space. One of the measures adopted by many during the pandemic was the creation of a Covid “social bubble,” or group of individuals that all agreed to interact with each other, while staying distant from those outside their group (Leng et al., 2020). Modern technology provided opportunities to maintain connection with individuals outside our bubble through virtual interactions, voice calls, and messaging. If in-person planned interactions are most meaningful, with interactions with family and friends being linked to the best quality outcome, then in times of limited in-person contact, this study suggests students should prioritize those with whom they have the most intimate relationships. Other research has found evidence that individuals during the pandemic adopted this strategy, choosing to spend time with those with whom they have stronger social ties (Storr et al., 2021). Similarly, the choice to move back home, for many students an involuntary decision, may have led to better outcomes than if students had stayed in their pandemic bubbles on campus while living with randomly assigned roommates, because of the increased strength of the ties and social support available. However, it is possible that physical disconnection from friends who help form social support networks, especially for those experiencing time zone differences, led to heightened feelings of loneliness and fewer opportunities for social interaction and self-care activities. Here, there is potential for future work to explore the links between types of people with whom we live

and the outcomes of meaningfulness of interactions, loneliness, and social support.

Unexpectedly, no link was found between differences in meaningfulness and the type of interaction activity, that is, various leisure versus focused activities. Some types of activity were fairly restricted compared to pre-Covid opportunities, especially for activities of leisure which are often also tied to self-care practices (e.g., visiting hair and nail salons). This lack of difference may reflect that leisure activities during the pandemic were likely to be closer in character to the activities of studying and working, especially for activities occurring virtually, and so presented similar patterns. Pandemic restrictions during Fall 2020 meant there was a decreased ability to access, and possibly heightened anxiety around the use of, public spaces for leisure. This may also help explain why interactions occurring in private versus public spaces did not vary significantly in meaningfulness. Even when participants were able to interact with each other in public, many regulations and space features likely detracted from quality of the interaction (e.g., socially distanced furniture, mask regulations). Future work could more deeply examine the ways in which public and private settings can each be conducive to high-quality interactions. The physical spaces themselves were not linked to meaningfulness in this study, likely due to the limited range of spaces in which participants recorded having interactions that day, a consequence of pandemic-related restrictions. Though meaningfulness was not significantly different based on types of interaction spaces used in the most recent interaction, work on the importance of Third Place and neighborhood characteristics suggests that the findings here might not be capturing a large enough

diversity of spaces necessary to detect effects of physical setting characteristics on meaningfulness with sufficient power. While other characteristics of the interaction were tested using less than 5 levels for any individual variable, a larger number of space types were available for participants to choose from, making it more difficult to detect a statistically significant result.

The moderately high feelings of loneliness found among college students in this study mirror not only other pandemic findings, but also the larger trend of increasing loneliness among this population and the associated age group. Correlations found between meaningfulness of the most recent interaction and loneliness, with close to significant links between the meaningfulness of the previous week's interactions and levels of loneliness support the findings of prior research (Wheeler et al., 1983) and point to the importance of understanding the implications of daily interaction opportunities and decisions.

This study had several limitations, primarily related to the participant sample. Eligible college students self-selected to be in this study, and an overwhelming majority of participants were female. Since recruitment materials mentioned social interactions explicitly, it is possible that those feeling vulnerable about discussing their social interactions (e.g., particularly lonely individuals) actively chose to not participate in the study, leading to discrepancies between the types of interactions and outcomes captured within the study and those that typify the greater college student population. Therefore, the results of this work should be replicated and furthered with a larger, more diverse, and representative sample. Lastly, despite alignment with findings from previous research, the design of the study precludes the ability to make claims regarding causation and is limited in its' conclusions regarding the direction of the relationship between social interaction meaningfulness and loneliness.

## CONCLUSION

Meaningful social interaction is both a type of self-care practice and an avenue for promoting positive self-care behaviors. Understanding the characteristics of the most meaningful interactions can help guide strategies for performing self-care activities and inform decisions regarding social interactions in the future. Self-care activities, including social interactions, were often limited or restricted during the COVID-19 pandemic. College students, a group of individuals already identified as experiencing high level of loneliness prior to the pandemic, experienced enormous changes in their daily social interactions. Whether during the pandemic or beyond, college students may be able to buffer against loneliness by strategically prioritizing the people, activities and conditions which are more likely to produce meaningful social interactions within their busy and stressful schedules. This may be particularly important in the short term when options for in-person interactions remain limited for some and Zoom fatigue is still an issue. While meaningful social interactions are in and of themselves a self-care strategy that can help improve mental health outcomes, mitigate loneliness, and bolster social support for college students, they also are avenues for promoting self-care activities.

University and government bodies can also help to mitigate loneliness by stressing the importance of focusing on interactions that promote self-care and health, particularly with those that provide social support and encourage self-care strategies. Considering the findings of this work and the recent emphasis on combating loneliness made by policy makers, researchers, and journalists, research in this area should continue to examine the factors with can promote more meaningful interactions in more depth. Further work in this area should uncover and examine if meaningfulness of an interaction with a close contact would be affected by the mode of the interaction, such as in-person versus virtual, including working to understand the mechanisms through which different modes of interaction impact outcomes. Future work should also examine in more depth the influence of the environmental setting of daily interactions on meaningfulness or loneliness outcomes, including consideration of which environmental or spatial characteristics can contribute to or detract from the quality of social interactions. This increased examination of the conditions that can facilitate more meaningful social interactions will allow researchers, institutions, and individuals to create strategies and make decisions in order to help promote effective self-care practices and mitigate loneliness among college students and other young adults.

## 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 Cornell University Institutional Review Board. The participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

RB involved in the preparation of the questionnaire, data collection and analysis, and manuscript writing. JL involved in advising the research direction, guiding the questionnaire formulation, and article revision. Both authors contributed to the article and approved the submitted version.

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# Adapting to Adversity: Effects of COVID-19 on Parenting in Chile

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The pandemic outbreak in March 2020 and its associated sanitary regulations and restrictions triggered an abrupt and significant change for society in general and for families' organization in particular. In Chile, the Santiago Metropolitan District was under a strict lockdown that involved the closure of the entire educational system. From a systemic-family stress perspective, the impact of these changes might have consequences not only for each individual family member, but for the parental dynamic and, consequently, for children's well-being. This paper presents the results of a follow-up study showing changes in self-reported parental depression and the perceived home organization of mothers and fathers assessed at three different moments: before the pandemic, at the initial outbreak, and after 1 month of strict lockdown. Relevant moderators were explored using linear mixed models to understand the within-subject changes in mothers' and fathers' self-reports across the different assessment times. Financial strain, personality traits of self-criticism and dependency, previous parent-child quality interaction, recent major stressful events, and number of children are highlighted as relevant factors that moderate changes in home chaos and parental mental health perception. Significant risks and protective factors are described for fathers and mothers. The use of pre-pandemic measures as baseline levels enabled the identification of personal and family characteristics that were related to better outcomes. The results help increase our understanding of the sanitary regulations' impacts on the family system and identify vulnerability indicators that should be considered.

**Keywords:** COVID-19, parenting, stress, depression, home chaos, parent-child interactions

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## INTRODUCTION

The current COVID-19 pandemic poses an acute threat to the well-being of children and families due to challenges related to a range of disruptions to daily functioning, such as financial insecurity, isolation, and confinement-related stress. Prime et al. (2020) illustrate the multitude of ways in which the well-being of children and families may be at risk during the COVID-19 pandemic through its effect on caregivers' well-being. Diverse studies have already reported negative consequences of the pandemic and its associated sanitary restrictions on mental health and family functioning, such as increased anxiety, depression, and sleep problems (e.g., Brown et al., 2020; Huang and Zhao, 2020; Statistics Canada, 2020).

Moreover, lockdowns and school closures have disturbed family interactions by transforming the home into a workspace and school for many families, which challenges the organization of daily life. For example, Segre et al. (2021) found that children had difficulties adapting to different

routines that resulted from new habits as products of the COVID-19 lockdowns and school closures. In this regard, lockdowns may result in more people remaining within the home for longer periods of time and may trigger changes to work schedules, which may lead to increased stress levels by imposing new demands on parents. These aspects together with the uncertainty about the future have had a profound impact on psychosocial outcomes, making research in this area a top priority (Holmes et al., 2020).

However, the impact of the pandemic and resultant adaptations in daily family life and family relationships remains largely unknown (Prime et al., 2020). Most literature does not include pre- and post-COVID-19 family data and focuses solely on mental health symptoms. Therefore, in this study we compare family functioning pre- and post-COVID-19 pandemic to examine the effect of this crisis on parents and family life. In addition, we examine how pre-existing parent and home-related variables were associated with such changes. Although potentially impactful for all individuals, preexisting individual and/or family characteristics (e.g., personality traits, poverty, and mental health) may function as risk factors by increasing the susceptibility to negative pandemic-related outcomes.

## Theoretical Background

The family stress model explains the process by which the experience of severe economic pressure undermines parents' mental health, parenting, and subsequent child adjustment (Conger and Conger, 2002). Theoretically, the model suggests that emotional distress associated with severe economic pressure is the mechanism by which risk for poor parenting and child maladjustment increases (Conger and Conger, 2002). This model has been expanded to examine how other stressful events – besides economic hardship – may have an impact on family life. When stressors become frequent or if parents or families lack the resources to overcome them, individuals and subsystems within the family may present maladjustment, including physical, emotional, and mental health symptoms.

We conceptualize the COVID-19 pandemic as a stressful event with the potential to produce change in different family subsystems (Patterson, 1988). The pandemic-related negative impacts may be particularly significant for parents and their young children because proximal processes in the home environment during the early years of life are an important predictor of a child's social and cognitive development (Bronfenbrenner and Evans, 2000). In addition, parenting young children is already a demanding task as caregivers are responsible not only for their children's survival, but also for their children's general well-being (Bornstein, 2014).

## Pandemic and Family Life

International research efforts show that the COVID-19 pandemic has generated extremely stressful conditions for individuals and families, resulting in a higher risk of developing mental health problems during COVID-19 outbreaks (Chaix et al., 2020; Wang et al., 2020). In a nationally representative Irish sample surveyed during the first week of government-imposed quarantine, 22.77% of people screened positive for depression, 20% screened positive for generalized anxiety, and 27.67% screened positive for both

depression and anxiety (Hyland et al., 2020). A study of people from 190 Chinese cities found moderate-to-severe levels of stress, anxiety, and depression during the initial outbreak that persisted 4 weeks later (Wang et al., 2020). More recently, a meta-analysis including 16 studies that assessed 78,225 participants reported an average depression prevalence of 34.31%. A sub-group analysis showed that depression was higher in China (36.32%) than in other countries (28.3%) (Necho et al., 2021).

The COVID-19 pandemic has also impacted levels of home chaos within the family context. The home environment refers to the setting in which family interactions take place, shaping individual behavior and development (Bronfenbrenner and Crouter, 1983). For the early years of life, the home environment is the principal microsystem in which a child's social and cognitive development takes place (Bronfenbrenner and Evans, 2000). Higher levels of home chaos (i.e., disorganization and instability) pose a significant risk for children's adjustment, given their dependence on positive family processes for a host of developmental outcomes. Some of the COVID-19-related restrictions (e.g., school closure, social distancing, lockdowns, etc.) may lead to increased home chaos by imposing new demands on parents, especially those of younger children who need monitoring and assistance to successfully engage in distance learning.

Home chaos is connected to a variety of adverse consequences for parents and young children. Parents may experience the environment as more unpredictable and out of their hands, creating a feeling of diminished control. Perceived uncontrollability appears to make parents more vulnerable to a reduced sense of parental efficacy and well-being (Tucker et al., 2017). Also, continued exposure to noise and crowding may increase physical fatigue, which in turn makes parents less cooperative and more aggressive (Wachs, 1992). Children living in chaotic home environments present poorer cognitive competence, less adequate language development, greater likelihood of a more difficult temperament, reduced mastery and motivation, and an increased risk of accidental injury (Wachs, 2000).

Home chaos during the COVID-19 pandemic-related lockdowns has been associated with increases in maternal-child conflict, paternal-child conflict (Cassinat et al., 2021), higher levels of parenting stress in parents of children aged 2 to 14 years (Spinelli et al., 2020), and increased parental distress and household chaos among low-income families (Johnson et al., 2021). These recent studies highlight the relevance of understanding family interactions impacted by the pandemic restrictions as a specific context. Importantly, individual and context-specific characteristics should also be considered to understand which of them constitute risk factors for mental health problems and negative family interactions.

## Individual Differences: Risk or Protective Factors?

Individuals within the population vary greatly in their vulnerability to stressful life events (Sapolsky, 2015). A predisposition to maladjustment may arise in a variety of

ways and at different stages of the life cycle. To develop targeted preventions and interventions aimed at those most vulnerable, we need to examine individual and family characteristics that influence well-being during the pandemic.

Research reveals several factors predicting differences in individual and family responses to stressful contexts, such as the COVID-19 pandemic. Some of these are low socioeconomic status, maladaptive personality traits, negative affect, and being female (Cao et al., 2020; Flesia et al., 2020; Hyland et al., 2020; Mazza et al., 2020). For example, people with low income are more likely to face chaotic living conditions than are their middle- and upper-income counterparts. In addition, economic-related stress and limited resources make them less equipped to circumvent or overcome chaos-related challenges (Evans et al., 2010). Other factors such as number of children, number of lockdown days, and number of stressful events are demands that diminished a parent's ability to deal with added stressors, such as those related to the ones experienced due to the COVID-19 pandemic (Kessler, 1997; Olhaberry and Farkas, 2012).

From a different perspective, personality characteristics are also suggested as influencing individual responses to stressful events. Specifically, some of these are associated with a high risk of developing symptoms of depression. Accordingly, Blatt's theory of depressive personality style describes self-criticism and dependency as predisposing the development of these symptoms (Blatt, 2008). Self-critical thinking takes place when specific standards are not met. Individuals who present strong self-criticism traits often hold very high expectations and standards for themselves, and fear disapproval and loss of control, which render them vulnerable to experiencing feelings of failure, worthlessness, and guilt. Dependency is related to intense fears of abandonment and loss, a high need to feel loved, and a strong tendency to seek support and help from others (Luyten et al., 2007). Experimental studies have shown that variations in dependency and self-criticism correlate not only with different subjective responses to stress, but also with differential sensitivities in the neurohormonal response to stress (i.e., cortisol response to interpersonal stress) (Silva et al., 2017). These characteristics may interfere with the capacity to effectively organize a complex home environment and may increase relationship stress, which in turn are negatively related to child development (Tang et al., 2016).

Given the systemic aspects of family relations, the quality of parent-child relationships may also play a role as a protective or risk factor for the negative impacts of the COVID-19 pandemic on families (Doty et al., 2017). Assessing parenting behaviors early in development is important because diverse studies suggest that parenting at an earlier time point robustly predicts parenting at a later time point (Dallaire and Weinraub, 2005). The relationship between parenting, depression and home chaos has been established in the literature. In general, parents who display positive (i.e., warmth, sensitivity or responsiveness) rather than negative (negative control, negative affect) parenting practices create a better context for development (Vandell et al., 2010). A meta-analysis concluded that depression was associated with negative

maternal behavior (Lovejoy et al., 2000). Other studies have found a relationship between negative parenting and higher levels of home chaos (Corapci and Wachs, 2002). Given that depression, household chaos, and parenting quality are in part dependent upon or manifested in the parents themselves, it is highly likely that the relation between parenting and home chaos and depression is of a transactional nature (Garrett-Peters et al., 2019).

Family characteristics may also place some parents at greater risk for negative consequences in their parenting practices and well-being during the pandemic. Compared to middle-class families, low-income families tend to experience more severe consequences associated with insufficient financial resources, augmenting the negative effect of financial stress on caregivers' mental health (Ponnet, 2014) with consequences for children's adjustment (Neppl et al., 2016). These characteristics may be exacerbated due to COVID-19 pandemic-related disruptions.

In order to develop targeted preventions and interventions aimed at those most vulnerable, we need to examine individual and family difference variables that influence well-being during the pandemic. Furthermore, despite similarities across different global regions, it is important to consider the specific local characteristics of sanitary measures, socioeconomic and political contexts, and populations' reactions.

## The COVID-19 Pandemic in Chile

The first cases of COVID-19 were detected in Chile in March 2020 in a context of social, political, and economic crisis associated with an earlier social protest outburst that took place in October 2019. This movement demanded equity and justice (Caqueo-Urizar et al., 2020). To prevent the spread of the virus, Chilean authorities imposed drastic measures in mid-March, including restrictive lockdowns, a national curfew, business closings and the complete shutdown of the educational system (i.e., daycares, schools, and universities) (Fischman and Irarrazaval, 2020). By the beginning of May, almost the entire Metropolitan District was placed in strict lockdown. These measures lasted between 3 and 4 months for the different areas of Santiago (i.e., the capital city) and for urban areas in the rest of the country, with significant consequences in several dimensions, including mental health and socioeconomic aspects. Consistent with international data, feelings of fear, anxiety, and sleep problems significantly increased in the general population (Dagnino et al., 2020).

From a socioeconomic perspective, the interruption of the normal functioning of diverse economic activities due to the pandemic-related restrictions led to job losses and household income reductions, especially for families with children and adolescents, where six out of ten households (59.4%) faced a decrease in income compared to their pre-pandemic situation (UNICEF et al., 2021). This was particularly significant for low socioeconomic groups and for female-headed households; 57.8% presented a decrease in their income compared to 50.8% of male-headed households, thus worsening the existent patterns of inequality in the country (UNICEF et al., 2021). Furthermore, the unemployment rate stood at 13.1% from May to July, its highest of the past 16 years (INE, 2020). These specific

contextual factors should be considered in order to understand the specific state of affairs in Chile and for the families that participated in this study.

In view of the complex relationship between mental health, parenting, and home organization, and the dramatic impact of the COVID-19 pandemic in Chile, this exploratory study examined the associations between a broad set of risk factors with parental depression and home chaos in the Chilean context during the health crisis. Specifically, we examined (1) how parental depressive symptoms and home chaos changed from before the pandemic to the initial lockdown; (2) if different parental characteristics (i.e., parental self-criticism, dependency, and positive/negative control in interactions with children) and family variables (i.e., economic strain and number of children) were associated with parental symptoms of depression and family chaos at the onset of the pandemic; (3) interaction effects to test if personal and family variables moderated the changes in depression symptoms and home chaos from before the pandemic to the initial lockdown.

We hypothesized an increase in depression and home chaos from the pre-pandemic period (T1) to the onset of lockdown (T2) and after 40 days of lockdown (T3). We also expected that stressful circumstances (i.e., longer periods of lockdown, financial difficulties) and personality traits (i.e., self-criticism and dependency) negatively contribute to parents' ability to adapt to the COVID-19 pandemic-related challenges, impairing their emotional well-being and family functioning.

## MATERIALS AND METHODS

### Participants

This study used a repeated-measures design to follow up on a sub-sample of 68 families who were involved in a larger study from the period before the COVID-19 pandemic (T1) to the onset of the lockdown restrictions (T2) and 40 days later (T3). Inclusion criteria were: (1) being an adult (i.e., 18 years of age or older), (2) cohabiting parents, (3) with a child aged 3 to 4 years at T1. Exclusion criteria for parents referred to diagnosis of an intellectual impairment, neurodevelopmental or severe psychiatric disorder (i.e., schizophrenia, bipolar disorder, major depressive disorder).

The T1 sample consisted of 120 low- to middle-income Chilean families. All children were living with both parents. Children's mean age at the first assessment was 35.78 months ( $SD = 3.77$ , range = 29–46), 47% were boys, and 51.3% were enrolled in childcare. The mothers' and fathers' mean age was 31.15 years ( $SD = 6.10$ ) and 33.9 years ( $SD = 7.09$ ), respectively. Most of the mothers (87%) and fathers (86%) reported having earned a high school diploma or beyond.

Only 77 families were reachable at T2 (64% of T1 sample) and invited to be part of this follow-up (T2 and T3) with 68 (88%) of these families agreeing to participate. At T2, most mothers (80.9%) reported living with their partner (i.e., the child's other parent) and 98.5% reported living with their child/children all of the time. The remaining 1.5% of mothers reported living with their child/children only some days per week. With regard to

the number of children per household, 26.5% of the mothers reported having only one child, 33.8% had two, 35.3% had three and 4.4% had four or more. The mothers' educational levels were distributed as follows: 8.8% did not finish secondary school, 26.5% completed secondary school, 36.8% did not finish higher education, 25% completed college or higher education. Taking into account paternal and maternal reports of combined monthly family income, 7.8% of our sample reported earning less than USD 250, 12.5% earned between USD 250 and 380, 29.7% earned between USD 380 and 640, 35.9% between USD 640 and 1,300 and 14.1% reported a monthly family income higher than USD 1,300. Maternal and paternal reports showed some small differences (see **Table 1**).

In Chile, 88% of the population minimally holds a higher education diploma and the mean year of completed education is 11.05. Families in our study are considered low- or middle-income if they have an average monthly household income between USD 734 and 1,468 (Ministerio de Desarrollo Social y Familia [MDSF], 2017). Currently, mean income in Chile stands at USD 796 per month and minimum wage is set at USD 415 per month.

### Procedures

For T1 (2018), we recruited participants through wall posters inviting mothers and fathers of children between the ages of 2.5

**TABLE 1** | Sample demographic characteristics at T2.

	Mother	Father
N° of children	<i>n</i> = 68	<i>n</i> = 65
1	26.5%	26.2%
2	33.8%	36.9%
3	35.3%	32.3%
4	2.9%	3.1%
5	1.5%	1.5%
Parent living with child	<i>n</i> = 68	<i>n</i> = 63
Yes	98.5%	82.5%
Some days a week	1.5%	7.9%
No	–	9.5%
Parent living with partner	<i>n</i> = 68	<i>n</i> = 63
Yes	80.9%	82.5%
No	19.1%	17.5%
Educational information	<i>n</i> = 68	<i>n</i> = 65
Incomplete primary school	1.5%	–
Complete primary school	2.9%	3.1%
Incomplete secondary school	4.4%	4.7%
Complete secondary school	26.5%	31.3%
Incomplete higher education	36.8%	26.6%
Complete higher education	25%	9.4%
Other	2.9%	25%
Household income	<i>n</i> = 64	<i>n</i> = 58
Less than \$250 USD	7.8%	–
Between \$250 – \$380 USD	12.5%	13.8%
Between \$380 – \$640 USD	29.7%	32.8%
Between \$640 – \$1300 USD	35.9%	36.2%
More than \$1300 USD	14.1%	17.2%



and 3.5 years to participate in a study on play, learning, and development (see **Supplementary Figure 1**) or by approaching them in the waiting rooms of four primary health care centers in the southern part of Chile's capital, Santiago. We contacted interested families by phone for further explanation of the project and scheduled appointments for the assessments that were conducted at the health care centers. Mothers and fathers completed questionnaires on paper during the assessments. Each family received an educational toy for their child, and children were given a sticker for participating. For T2 (April 2020) and T3 (40 days after T2) families were contacted via phone to invite them to participate in the follow-up study. Families who agreed to participate were informed over the phone about the study characteristics and had the opportunity to ask questions about the procedure. Families received the study information sheet and informed consent, which stated the study's general purpose, the instrument's length, and the contact details of the principal investigator. Those who agreed to participate completed a set of online questionnaires when mandatory quarantine was implemented in Santiago (T2) and again 40 days later (T3). Each questionnaire was designed to fit on the screen, resulting in five screen views of questions for participants to read and complete. All participants received USD 7 upon completion. The study procedures were approved by the University Institutional Review Board. For more information on the recruitment process and survey characteristics, see **Supplementary Table 1**.

## Instruments

### Depression

At T1, T2, and T3, parents completed the Spanish version of the Depression Scale of the Center for Epidemiological Studies (CES-D; Radloff, 1977; Eaton et al., 2004). The CES-D is a ten-item, self-report questionnaire that assesses depressive symptoms over the past week. The total score ranges from 0 to 30 and higher scores show greater symptom severity. Scores higher than 10 indicate risk of presenting a depressive disorder. The Cronbach's  $\alpha$  of the scale across the three assessment times ranged from 0.78 to 0.89 for maternal reports, from 0.76 to 0.85 for paternal reports, and from 0.80 to 0.87 for maternal and paternal reports combined.

### Home Chaos

At T1, T2, and T3, mothers and fathers completed the CHAOS scale (Confusion, Hubbub, and Order Scale; Matheny et al., 1995) that evaluates routines and home organization. This questionnaire was translated into Spanish and is used with various Spanish-speaking populations (Haack et al., 2011). The total score range for this scale is 15 to 75 with higher scores reflecting a greater perception of chaos and disorganization in the home. Cronbach's  $\alpha$  of the scale across the three assessment times ranged from 0.80 to 0.88 for maternal reports, from 0.75 to 0.85 for paternal reports, and from 0.78 to 0.87 for the combined maternal and paternal reports.

### Sociodemographic Information

At T1 and T2, mothers and fathers reported their age, number of children, level of education, and monthly family household

income. Participants also reported on a number of stressful events that occurred between T1 and T2 (10 event options including accidents, unemployment, family member's death, divorce, and others).

### Quality of Parent–Child Interactions

At T1 the mother–child and father–child free-play interactions were coded using the Parent–Child Interaction System (PARCHISY; Deater-Deckard and Dodge, 1997). For the purpose of this study, only positive and negative control coding were used; positive control (i.e., use of praise, explanations and open questions) and negative control (i.e., redirection of the child's behavior, paying little or no attention to the child's interests, negative control) were coded on a seven-point Likert scale ranging from very low (1) to very high (7). All father–child and mother–child interactions were coded independently by two researchers (trained by the PI) with good inter-rater reliability for 25% of the entire sample (Cronbach's  $\alpha = 0.93$ ).

### Personality Traits

The Depressive Experiences Questionnaire (DEQ; Blatt et al., 1976) from the polarities of experience model (Blatt, 1974) was completed by fathers and mothers at the final assessment (T3). This 66-item instrument has been widely used in personality and character styles research (Zuroff et al., 1990). Dependency and self-criticism personality dimensions are obtained from this tool following the scoring method instructed in the original description of the scale (Blatt et al., 1976). The scores ranged from  $-3.5$  to  $+3.5$  points (standardized score). The estimation of the subscale scores considers all the items, but they are weighted differently in the subscales. Therefore, the reliability of the scale as a whole was calculated using Cronbach's alpha (value 0.87).

### COVID-19 Experience

At T2 and T3 parents reported the socio-economic consequences of the COVID-19 crisis for the item “*My economic situation has been affected by coronavirus*” on a seven-point Likert scale (1 = no consequences – 7 = severe consequences). The number of lockdown days was also reported by a single item; range between no confinement (score zero), 1 week of confinement (score 1) sequentially until 8 weeks of confinement and nine or more weeks of confinement (score 9).

## Analysis

We conducted a descriptive analysis of the data and estimated Pearson correlations between variables. Also, mothers' and fathers' ratings were compared with an dependent-samples *t*-test. For each one of the dependent variables (i.e., depressive symptoms and CHAOS), a two-piece discontinuous model of change was modeled with a linear mixed model (LMM). The analyses were conducted with IBM-SPSS v.23 (REML estimation method) using a model-building approach (Hoffman, 2015). Based on theoretical considerations and our descriptive results, we selected the following variables to test in the moderation analysis: negative control, self-criticism and economic strain.

From a theoretical perspective, the variance of dependent variables could be included in a three-level model; three time

points (Level 1) were nested within persons (Level 2) and then nested within families (Level 3). It is reasonable to propose that mothers and fathers belonging to the same family have some degree of data non-independence based on their kinship linkage or their daily interactions (Kenny et al., 2006). Nevertheless, this assumption must be evaluated empirically.

In the case of parental depressive symptoms, using the ML-2ΔLL test (Hoffman, 2015) a single-level model (independent data) was compared to a two-level model (time points nested within persons), and the latter was compared to a three-level model (time points nested within persons, and both nested within families), showing that a two-level model was more adequate than a single model, ML-2ΔLL test = 46.3 (1 df.),  $p < 0.001$ . Nevertheless, the three-level model fit did not improve with respect to the previous one, ML-2ΔLL test = 1.0 (1 df.),  $p = 0.307$ , indicating that there was no between-family intercept variation. Thus, a two-level model composed of time points nested within persons was created.

First, the null model was estimated to account for the intra-class correlation (ICC). We then described the change over time (step 1). In this step, the two-pieces discontinuous model fixed the intercept at the beginning of lockdown (indicating the value of parental depressive symptoms at T2). The first slope accounted for the pre-COVID-19 change (T1 to T2, coded as  $-1$ ), and the second slope accounted for change during the lockdown period (T2 to T3, coded as  $+1$ ). Based on data variability, a random intercept and pre-COVID-19 slope were modeled. Their covariance was also estimated.

In the second step, several individual (i.e., mother, child gender, parent age, stressful events and dimensions of polarities of the experience) and contextual predictors (i.e., economic strain and lockdown days due to COVID-19, number of children, positive and negative parental control) were included to explain the intercept. The predictors were identified following preliminary analyses and according to their theoretical relevance. In step three, some specific interaction terms were included to account for differences in pre-COVID-19 changes in parental depressive symptoms. This model incorporated all significant step 2 predictors. All predictors were centered with respect to their mean (except the mother variable).

A similar procedure was followed for the chaos variable. Before establishing the models, we determined which levels should be included. This analysis shows that the two-level model was more adequate than a single model, ML-2ΔLL test = 52.1 (1 df.),  $p < 0.001$ , and that the three-level model fit did improve with respect to the previous one, ML-2ΔLL test = 11.6 (1 df.),  $p < 0.001$ . Consequently, in this case, a three-level model composed of three time points nested within persons and in turn nested within families was devised. It was necessary to model level  $-1$  as a diagonal matrix to the Hessian matrix for convergence.

In the first step, the two-piece discontinuous model fixed the intercept at the beginning of lockdown, and one of the slopes accounted for the pre-COVID-19 change and the other one accounted for change during the lockdown period. Based on data variability, a random intercept and pre-COVID-19 slope were modeled at level two (person) and level three (family). Finally, their respective covariance was estimated only at level three.

In the second step, in addition to individual and contextual predictors, we included “family variables.” These variables were composed as a mean of the mother’s and father’s values in each respective family. This procedure considered all predictors that could capture differences within families (e.g., the mothers report more stressful events than their partners) and between families (e.g., parents of one family report more stressful events than the others). This procedure was done based on Hoffman (2015), who recommends it in order to prevent conflating the variance of person-level (mother or father report) with the variance associated with family level. Accordingly, most predictors (except mother, child’s sex and number of children variables, which are fixed within families) were modeled by two parameters; one that captures within-family variance and another that captures between-family variance. Both parameters were group-mean centered.

Lastly, interaction terms were included to account for differences in pre-COVID-19 changes in chaos (step three). This model incorporated all significant step-two predictors and hypothesized interaction terms (parameters to model within and between variance were modeled together).

Additionally, we used a Monte Carlo simulation to estimate the observed power of fixed effects. This procedure assumes that the estimated parameter values of the sample are the true population values for these parameters. Based on this assumption, 1,000 replication samples were generated from this population model using the original sample size and their time points per subject to determine the number of samples in which certain parameters are statistically significant (Bolger and Laurenceau, 2013). This percentage of samples capture the statistical power. The *post-hoc* power estimated for each fixed parameter included in the model was reported in the corresponding table.

## RESULTS

### Descriptive Results

The descriptive characteristics of the participants are in **Table 2**. Our results show that at the three assessment times, mothers reported higher levels of depression than their male partners [T1:  $t(64) = 2.46$ ,  $p = 0.017$ ; T2:  $t(62) = 4.30$ ,  $p < 0.001$ ; T3:  $t(64) = 2.46$ ,  $p = 0.017$ ]. We found a similar pattern for maternal reports of home chaos, which were higher than paternal reports at T1 and T2 [T1:  $t(64) = 2.08$ ,  $p = 0.041$ ; T2:  $t(61) = 2.44$ ,  $p = 0.018$ ]. No differences between mothers and fathers were found in this variable at T3. Mothers also reported being confined for longer periods of time than fathers [ $t(58) = 2.826$ ,  $p = 0.006$ ].

We found no significant differences between mothers and fathers in terms of the number of stressful events experienced between the first assessment (T1) and the beginning of lockdown (T2) [ $t(62) = 0.30$ ,  $p = 0.766$ ], and the perception of change in financial security due to the COVID-19 pandemic [ $t(61) = 0.07$ ,  $p = 0.945$ ]. Similarly, mothers and fathers provided similar reports on dependency [ $t(55) = 1.38$ ,  $p = 0.173$ ] and self-criticism [ $t(55) = 1.51$ ,  $p = 0.136$ ] and the use of positive [ $t(61) = 0.61$ ,  $p = 0.545$ ] and negative control parenting [ $t(61) = 1.56$ ,  $p = 0.123$ ].

**TABLE 2 |** Descriptive data of mother's and father's characteristics and context.

	Mother report			Father report		
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
1. Child sex (1 = female)	0.52	0.50	65	0.52	0.50	65
2. Adult's age	31.44	5.82	64	33.49	6.82	65
3. Lockdown duration	2.96	1.28	67	2.30	1.38	60
4. Economic strain	4.62	2.12	68	4.61	2.11	62
5. Number of children	2.19	0.92	68	2.17	0.91	65
6. Stressful events	1.88	1.31	68	1.76	1.01	63
7. Negative control	2.02	1.30	63	1.70	0.81	64
8. Positive control	4.57	1.09	63	4.47	1.31	64
9. Dependency	−0.95	0.70	62	−1.06	0.59	60
10. Self-criticism	−0.87	0.85	62	−0.99	0.86	60
11. Depressive symptoms time 1	8.62	5.33	65	6.66	5.05	65
12. Depressive symptoms time 2	12.35	5.11	68	8.84	5.24	63
13. Depressive symptoms time 3	12.73	6.48	63	9.85	5.40	59
14. Chaos time 1	37.95	8.73	65	35.90	6.68	63
15. Chaos time 2	56.15	7.40	66	53.76	6.85	63
16. Chaos time 3	54.34	7.82	62	52.05	6.87	60

Most maternal and paternal reports on the study variables were not significantly correlated (see **Table 3**), yet the maternal perception of increased financial insecurity due to the COVID-19 pandemic was significantly associated with higher symptoms of paternal depression at T3. Also, larger numbers of children reported by mothers was positively associated with the level of chaos perceived by fathers at T1, although both parents reported having a similar number of children ( $r = 0.95$ ,  $p < 0.001$ ). In contrast, the larger number of children reported by fathers was related to higher maternal perception of home chaos during the three assessment times. With regard to the number of

stressful events, maternal reports were positively associated with symptoms of maternal depression at T2 and with paternal reports of home chaos at T3. Similarly, paternal reports of more frequent stressful events were positively associated with maternal symptoms of depression and perception of home chaos at T3.

Interestingly, maternal and paternal reports of depression were not significantly correlated ( $0.21 > r > 0.26$ ; all  $p$ -values were non-significant). However, their reports of home chaos were positively associated, despite the differences in the average perception of home chaos between mothers and fathers ( $0.38 > r > 0.43$ , all  $p < 0.001$ ).

## Depressive Symptoms

Of the total variation of depression symptoms over time, 38% ( $ICC = 0.38$ ) corresponds to between-person differences and the remaining amount corresponds to within-person differences. Parents reported a significant increase in depressive symptoms from T1 ( $M = 7.62$ ) to T2 ( $M = 10.69$ ), but not compared to T3 ( $M = 11.40$ ). At the beginning of the lockdown (intercept), mothers reported higher levels of depressive symptoms ( $\beta = 2.03$ ,  $p < 0.01$ ) than fathers. Both the dependency and self-criticism personality factors were positively related to parental depressive symptoms at the beginning of the lockdown due to the COVID-19 pandemic (T2). No other variables were related to parental depressive symptoms during this assessment time (see **Table 4** for detailed parameters).

Focusing on the change in parental depressive symptoms, the interaction term indicated that parents with high scores in self-criticism showed a steeper slope increase in depressive symptoms from T1 to T2 (**Figure 1**).

Finally, although the deterioration of the economic situation is not related to the level of depressive symptoms at the onset of lockdown (T2,  $\beta = 0.35$ ,  $p = 0.192$ ), the increase in parental

**TABLE 3 |** Correlations between study variables.

Mother report	Father report															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Child sex (1 = female)	1***	−0.30*	−0.15	−0.30*	−0.16	0.16	−0.04	0.00	0.04	−0.14	0.05	−0.03	−0.08	0.01	−0.06	0.11
2. Adult's age	−0.17	0.82***	0.14	−0.04	0.61***	−0.02	0.04	0.13	0.20	−0.22	0.07	−0.19	−0.07	0.07	0.21	−0.03
3. Number of lockdown days	−0.13	0.16	0.09	−0.13	−0.14	−0.08	−0.29*	0.07	−0.03	−0.07	−0.28*	−0.13	−0.17	−0.28*	0.06	−0.24
4. Economic strain	−0.32**	0.12	−0.14	0.63***	0.17	0.14	−0.11	−0.19	0.01	0.26*	−0.13	0.14	0.29*	−0.21	0.16	0.20
5. Number of children	−0.16	0.46***	−0.04	0.09	0.95***	0.18	0.01	0.07	0.13	−0.15	0.19	−0.16	−0.16	0.26*	0.23	0.10
6. Stressful situations	−0.15	−0.23	−0.08	0.22	−0.19	0.41***	−0.09	0.06	−0.01	0.35**	0.14	0.27*	0.23	0.09	0.16	0.31*
7. Negative control	−0.21	0.05	0.12	0.18	−0.18	−0.12	0.20	−0.22	0.02	−0.05	−0.14	−0.09	0.11	−0.01	0.02	−0.08
8. Positive control	0.35**	0.03	0.90	−0.11	0.23	0.35**	−0.10	0.28*	−0.00	0.04	0.17	−0.09	−0.07	0.07	0.02	0.08
9. Dependency	−0.08	−0.05	−0.15	−0.04	−0.09	0.01	0.02	0.02	0.09	−0.04	−0.07	0.11	−0.06	−0.06	−0.05	−0.06
10. Self-criticism	−0.18	−0.27*	−0.09	−0.09	0.13	0.12	−0.07	−0.06	−0.08	0.24	−0.12	0.21	0.21	−0.07	−0.06	0.09
11. Depressive S. T1	−0.17	−0.30*	−0.05	−0.01	0.09	0.14	−0.08	0.19	−0.05	0.12	0.24	0.07	0.08	0.06	0.03	0.01
12. Depressive S. T2	−0.19	−0.03	−0.02	0.03	0.08	0.14	−0.06	−0.01	0.15	0.14	0.04	0.22	0.08	−0.08	0.14	0.10
13. Depressive S. T3	−0.22	0.01	−0.15	−0.05	0.18	0.23*	−0.19	0.09	0.04	0.13	0.04	0.29*	0.25	−0.07	0.11	0.22
14. Chaos T1	−0.21	0.04	−0.11	0.04	0.39***	0.22	0.13	0.01	0.07	0.10	0.16	0.00	0.12	0.39***	0.37**	0.15
15. Chaos T2	0.133	0.18	−0.19	−0.18	0.37***	0.22	−0.14	0.12	0.03	−0.11	0.02	0.02	−0.10	0.07	0.42***	0.29*
16. Chaos T3	−0.07	0.18	−0.21	−0.02	0.49***	0.34**	−0.21	0.16	−0.01	0.07	−0.07	0.07	0.11	−0.06	0.39**	0.42***

S, Symptoms. Correlations were estimated using pairwise deletion. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

**TABLE 4 |** Model of individual and contextual variables on parental depression.

Fixed effects	Step 1		Step 2		Step 3	
	Estimate	Post-hoc power	Estimate	Post-hoc power	Estimate	Post-hoc power
Intercept <sup>a</sup>	10.69***	0.99	9.53***	0.18	9.61***	0.99
Slope pre-COVID	3.07***	0.86	3.11***	0.99	3.15***	0.99
Slope during lockdown	0.73	0.38	0.80	0.47	0.74	0.44
<b>Control variables</b>						
Mother <sup>b</sup>	–	–	2.03**	0.90	1.92**	0.87
Child sex (1 = female)	–	–	–0.43	0.07	–	–
Adult's age	–	–	–0.07	0.30	–	–
Stressful situations	–	–	0.33	0.62	–	–
<b>Contextual variables</b>						
Economic strain	–	–	0.14	0.26	0.35	0.77
Number of children	–	–	0.58	0.97	–	–
Lockdown duration	–	–	0.02	0.07	–	–
Parental negative control	–	–	0.09	0.15	–0.13	0.16
Parental positive control	–	–	0.17	0.30	–	–
<b>Individual characteristics</b>						
Dependency	–	–	1.25*	0.99	1.43**	0.99
Self-criticism	–	–	2.39***	0.99	3.49***	0.99
<b>Interactions</b>						
Slope pre-COVID * Economic strain	–	–	–	–	0.54*	0.80
Slope pre-COVID * Self-criticism	–	–	–	–	1.75**	0.99
Slope pre-COVID * Parental negative control	–	–	–	–	–0.55	0.70
<b>Random effects</b>						
Random intercept variance (Level-2: Person)	22.60***		11.76***		10.48***	
Random slope: Pre-COVID Variance	18.42***		15.60***		12.20**	
Intercept slope: Pre-COVID covariance	12.18***		7.98**		6.04*	
Residual variance	11.03***		11.48***		11.43***	

Level-2,  $N = 136$ ; Level-1,  $N = 408$ .

<sup>a</sup>Intercept was modeled by slope pre-COVID = 0 and slope during lockdown = 0; and time variables slope pre-COVID = –1 and slope during lockdown = 1.

<sup>b</sup>All predictors are grand-mean centered, except by mother (1 = mother; 0 = father).

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

depressive symptomatology between time 1 (2018) and that moment (T2) depends on the level of economic deterioration linked to the pandemic crisis. Therefore, a steeper increase in parental depressive symptoms occurred in families whose parents experienced greater deterioration in their economic situation (Figure 2).

## Home Chaos

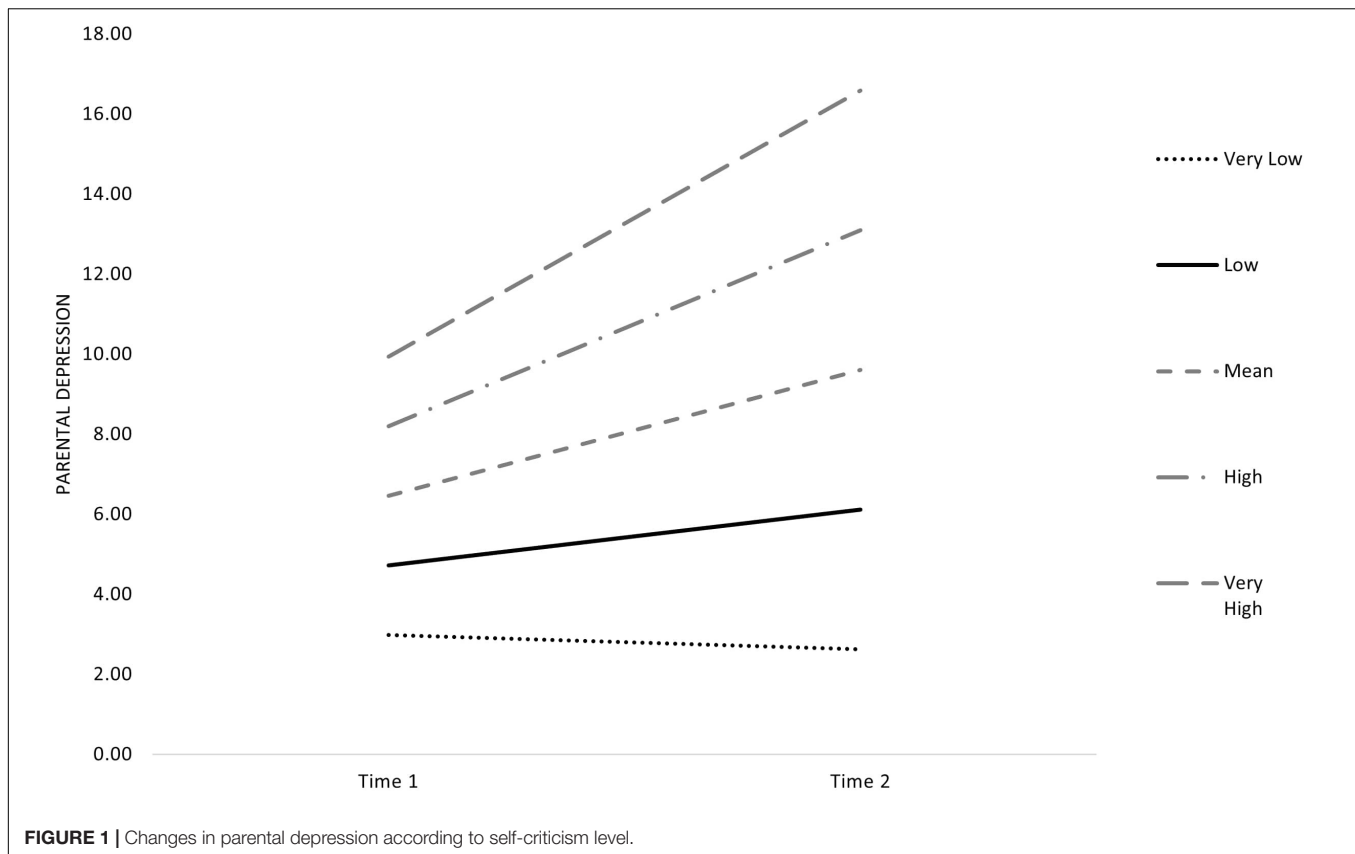
The levels of home chaos showed a significant increase from T1 ( $M = 36.80$ ) to T2 ( $M = 55.05$ ) and a small but significant decrease from T2 to T3 ( $M = 53.33$ ). At the beginning of the lockdown (intercept), bigger families ( $\beta = 2.81$ ,  $p < 0.01$ ) who had experienced more stressful situations ( $\beta = 1.69$ ,  $p < 0.05$ ) and where the parents had higher levels of self-criticism ( $\beta = 3.33$ ,  $p < 0.001$ ) reported higher levels of home chaos. No other variables were related to home chaos during this assessment time (see Table 5 for detailed parameters).

Finally, only one of the interaction terms was significant, indicating that families with higher levels of negative control showed a less prominent change in home chaos from T1 to T2 (Figure 3).

## DISCUSSION

This study examined associations between a broad set of risk factors with parental depression and home chaos in the context of the COVID-19 pandemic in a Chilean sample. The parents in our study reported an increase in symptoms of depression from the period before the onset of the pandemic to the start of the lockdown, these symptoms remained high later on during the pandemic. This is in line with previous studies, which have consistently reported a significant decrease in emotional well-being during the COVID-19 pandemic (Wang et al., 2020; World Health Organization, 2020). Our results show interesting associations between parental characteristics and lockdown-related aspects, which may explain the persistent increase in reports of depression.

Another relevant variable contributing to parental depression was financial hardship. In our study, both mothers and fathers who reported larger increases in financial hardship related to the pandemic also showed a larger increase in symptoms of depression from the period before the onset of the pandemic to the start of the lockdown. A recent cross-sectional study



conducted in the United Kingdom found similar results, showing that greater financial hardship experienced during the pandemic was related to poorer mental health in adults (Smith et al., 2020). This is particularly relevant for our national context in which studies prior to the COVID-19 pandemic showed a high frequency of depressive disorders (Toledo et al., 2015) and substance abuse (González Suitt et al., 2019), which were aggravated by socioeconomic inequalities (Rotarou and Sakellariou, 2017).

Interestingly, high financial stress in our study as reported by mothers was moderately correlated with paternal depression. Considering the traditional role division that often exists in Chilean families where men have more responsibilities as family providers (Aguayo et al., 2016), it may be possible that women's perception of financial hardship contributes to men's awareness of the difficulties they face in fulfilling their social role, impacting their emotional well-being as a result.

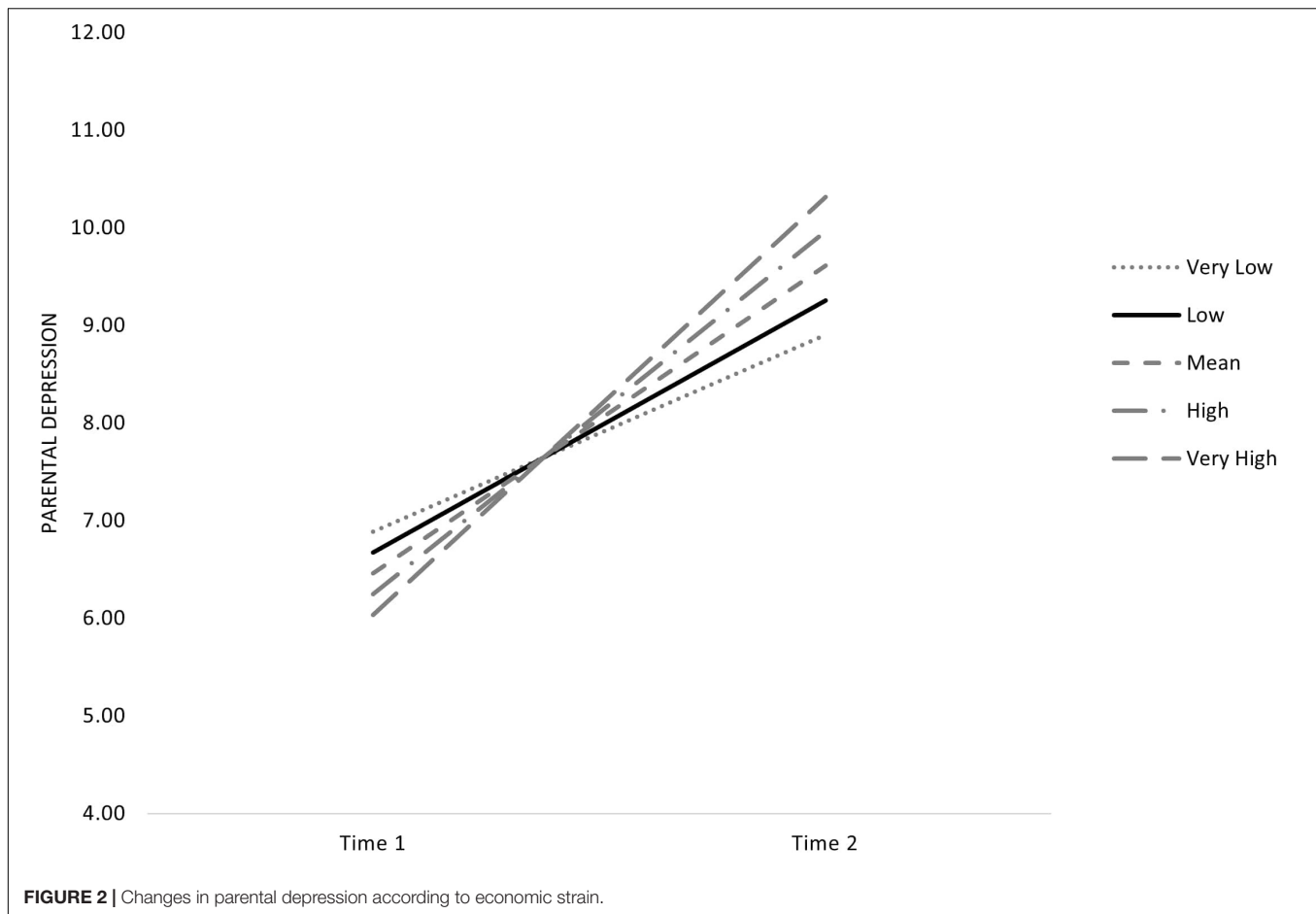
We also found interesting associations between maternal and paternal reports about stressful events, depression and chaos perception, which suggest complex, bidirectional relationships within the parental couples' perceptions. For instance, maternal reports of higher stressful events before the pandemic were related to fathers' perceptions of home chaos later on during the pandemic. Similarly, paternal reports of more stressful events were associated with maternal depression and chaos perception during the pandemic. Stressed and/or depressed parents may be less likely to support their partner during the pandemic and to

effectively manage the additional challenges related to childcare and domestic work, thus imposing a burden on their partner and possibly negatively affecting their emotional well-being.

When comparing parental reports from mothers and fathers, interesting differences were found. For instance, mothers reported higher overall levels of home chaos and depression than fathers before the beginning of the COVID-19 pandemic. Then during the pandemic mothers experienced more lockdown days than fathers. Previous studies have shown that women experience higher rates of depression than men, especially during their reproductive years. This phenomenon is associated with diverse neurobiological aspects (Eid et al., 2019), but also with the implication of women's disproportionate engagement in caring activities compared to men. In Chile, mothers devote double the time that men do to caring for family members (Servicio Nacional de la Mujer, 2009; Comunidad Mujer, 2017), which may explain why mothers reported longer lockdown duration than their partners. Fathers still have low participation in co-parenting tasks. Data from 1,600 households in 2020 showed that 57% of fathers reported dedicating zero time to childcare activities for those under 14 years of age, which implies that women dedicate 3.2 more hours per day on average than men to unpaid domestic work (Encuesta de Bienestar Social, 2021).

The results of our moderation analyses suggest that both mothers' and fathers' self-criticism and dependency personality traits contributed to their depression symptoms, and those





individuals with higher levels of self-criticism reported a larger increase in depressive symptomatology than parents with low levels of self-criticism. Self-criticism has not only been related to a higher physiological reactivity to stress (Silva et al., 2017), but also to deficiencies in the response to reward (favoring anhedonia) (Silva et al., 2018), which could explain this greater association with depression in our study. Hence, our findings support Blatt's theory of depressive personality style, suggesting that both self-criticism and dependency traits predispose individuals to developing depression (Blatt, 2008). Accordingly, two recent systematic reviews (McIntyre et al., 2018; Werner et al., 2019) showed that self-criticism not only contributes to depression, but is also involved in the development of diverse mental health problems; thus, it can be viewed as a transdiagnostic process.

When exploring aspects associated with home chaos, we found that families with more children, who reported more stress events and parents with high self-criticism reported higher levels of home chaos at the beginning of pandemic lockdown than their counterparts. In this regard, self-criticism is associated with harsh standards, excessive striving for achievement, and a high need for acknowledgment (Blatt, 2008; Stoeber et al., 2008). Campos et al. (2018) also suggest that self-criticism is associated with less effective coping and adaptation strategies. It may be

possible that parents who report high self-criticism traits have very high expectations of themselves and their children and may have difficulties adapting to and coping with family-related challenges. Parents with these characteristics may be reluctant to lower their high standards in terms of work performance, home organization, and children's school performance, and may use positive and negative control strategies to restrict home chaos.

The changes in the perception of home chaos from the period before the pandemic to the lockdown was dependent on the levels of negative parental control. Surprisingly, families who reported the least increase in chaos from T1 to T2 were families with parents who displayed higher levels of negative control before the pandemic. This suggests that more restrictive parents were able to manage home disorganization better when the lockdown began. However, these effects disappeared by our third assessment (i.e., 40 days later), in line with studies showing that negative control increases short-term compliance in children, yet produces negative, long-term consequences for children's socioemotional development (Berthelon et al., 2020). Future studies could examine possible associations between parental self-criticism, parenting practices, and child development.

The results of this study are limited by the sample size and characteristics (i.e., cohabiting families of children 3 to 4 years

**TABLE 5 |** Model of individual and contextual variables on chaos.

Fixed effects	Step 1		Step 2		Step 3	
	Estimate	Post-hoc power	Estimate	Post-hoc power	Estimate	Post-hoc power
Intercept <sup>a</sup>	55.05***	0.99	51.06***	0.99	51.36***	0.99
Slope pre-COVID	18.25***	0.99	18.06***	0.99	16.56***	0.99
Slope during lockdown	−1.72**	0.84	−1.54*	0.89	−1.52*	0.88
<b>Control</b>						
Mother <sup>b</sup>	—		1.78	0.53	—	
Child sex (1 = female) <sup>c</sup>	—		0.29	0.10	—	
Within-family: Parent age	—		0.05	0.09	—	
Between-family: Parents age	—		0.10	0.29	—	
Within-family: Stressful situations	—		−0.84	0.07	−0.99	0.06
Between-family: Stressful situations	—		1.69*	0.89	1.22 <sup>T</sup>	0.69
<b>Contextual variables</b>						
Within-family: Economic strain	—		0.65	0.28	0.66	0.26
Between-family: Economic strain	—		−0.44	0.36	−0.18	0.13
Number of children <sup>c</sup>	—		2.81**	0.99	3.17***	0.99
Within-family: Lockdown duration	—		0.20	0.16	—	
Between-family: Lockdown days	—		−0.45	0.41	—	
Within-family: Parental negative control	—		0.07	0.06	0.14	0.07
Between-family: Parental negative control	—		0.56	0.20	−0.13	0.06
Within-family: Parental positive control	—		0.03	0.07	—	
Between-family: Parental positive control	—		−0.64	0.26	—	
<b>Individual characteristics</b>						
Within-family: Dependency	—		−0.68	0.13	—	
Between family: Dependency	—		−0.66	0.15	—	
Within-family: Self-criticism	—		3.33***	0.94	4.00***	0.97
Between-family: Self-criticism	—		1.52	0.55	1.84	0.57
<b>Interactions</b>						
Slope pre-COVID * Within-family Economic strain	—		—		−0.31	0.08
Slope pre-COVID * Between-family Economic strain	—		—		0.44	0.19
Slope pre-COVID * Within-family Self-criticism	—		—		1.68	0.16
Slope pre-COVID * Between-family Self-criticism	—		—		0.25	0.09
Slope pre-COVID * Within-family Parental negative control	—		—		−1.24	0.23
Slope pre-COVID * Between-family Parental negative control	—		—		−2.26*	0.56
<b>Random effects</b>						
Level-3 intercept variance (Level-3: Family)	17.82**		17.02**		16.39**	
Level-3 pre-COVID-slope	27.89***		28.73**		26.37**	
Level-3 intercept-slope pre-COVID covariance	11.81*		14.67*		13.18*	
Level-2 intercept variance (Level-2: Person)	16.94***		10.73*		10.42**	
Level-2 pre-COVID-slope	16.94***		10.73*		10.42**	
Residual variance time 1	4.77		16.21		15.11	
Residual variance time 2	21.33***		22.40***		21.12***	
Residual variance time 3	17.00***		15.48***		15.87***	

Level-3,  $N = 68$ ; Level-2,  $N = 136$ ; Level-1,  $N = 408$ .

<sup>a</sup>Intercept was modeled by slope pre-COVID = 0 and slope during lockdown = 0; and time variables slope pre-COVID = −1 and slope during lockdown = 1.

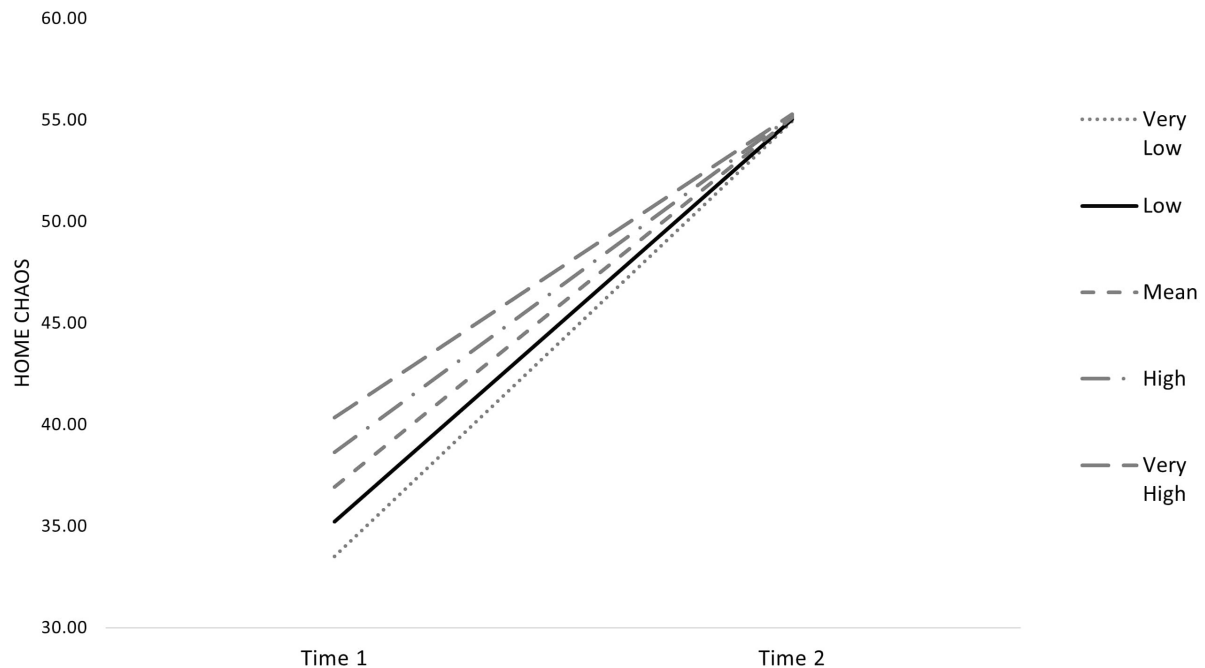
<sup>b</sup>Mother (1 = mother; 0 = father).

<sup>c</sup>Grand mean centered. All other predictors are group mean centered.

$T < 0.06$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

of age), so they cannot be generalized to families with single parents and/or older or younger children. Also, the assessment of mental health and home chaos was conducted using self-report measures. Nevertheless, the repeated-measures design allowed us

to examine changes in these variables across the course of the COVID-19 pandemic in a sample of Chilean families which is representative of the middle-class population as explained in the description of the participants.



**FIGURE 3** | Changes in home chaos according to parental negative control.

## CONCLUSION

Sanitary restrictions put in place to respond to the first pandemic outbreak had a strong impact on families' mental health and organization. This study examines specific risk and protective factors that should be considered for adapting to non-normative social stressors, such as the COVID-19 pandemic. Our findings evidence how changes in parental self-reported depression and perception of home organization before and during the first month of strict lockdown in Chile were associated with financial stability level, personality traits, recently experienced major life events, and number of children. These results can offer relevant insight for health care professionals and public policy designers who must focalize resources and interventions for reducing the negative impact of the sanitary restrictions in light of vulnerability factors.

## 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 Comité de Ética Institucional de Investigación-Universidad del Desarrollo. Written informed consent to participate in this study was provided by the participants and in case of minors by the participants or their legal guardian/next of kin.

## AUTHOR CONTRIBUTIONS

JP participated in the analysis, development, and design of the article. DA participated in the article design and development. SC participated in the writing and development of the manuscript. AV-C participated in the data collection, development, and design of the article. EG participated in the article development. JS participated in the experimental design and overall review of 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.2022.868817/full#supplementary-material>

**Supplementary Figure 1** | Recruitment Flyer.

**Supplementary Table 1** | Checklist for Reporting Results of Internet E-Surveys (CHERRIES).

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# Time Outdoors in Nature to Improve Staff Well-Being: Examining Changes in Behaviors and Motivations Among University Staff in the Use of Natural Outdoor Environments Since the Emergence of the COVID-19 Pandemic

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**Background:** Work-related stress is of growing concern to employers because of its significant implications for employee dissatisfaction, reduced productivity, and lowered emotional and physical health. Job-related stress is particularly acute among staff members in higher education, negatively impacting the professional work and personal welfare of staff. During the COVID-19 pandemic, stress levels increased, due to work- and non-work-related factors. Work expectations and environments shifted, as did new non-work responsibilities, such as care of dependents. As a result, many people were forced to spend much more time at home. Given the anticipated levels of stress (higher) and the change in time spent at home (increased), we sought to explore if adults were spending more time outdoors, as compared to pre-pandemic times, and if so, for what purposes. We hypothesized that people would be spending more time outdoors in nature during the pandemic, and that they would be doing so to achieve some of the well-documented benefits including managing stress, and bolstering mental health and wellbeing. We further hypothesized that some staff would experience barriers to spending time outdoors in natural outdoor environments (NOEs), potentially limiting their ability to experience these beneficial effects.

**Materials and Methods:** This study surveyed 507 staff from a large United States university to examine the degree to which staff were spending time in natural outdoor environments (NOEs) during the pandemic (two time-points, compared to pre-pandemic), and whether and how nature-based routines changed as a result of its emergence. The study also examined whether staff were motivated to spend time in nature to improve their mental health and/or wellbeing.

**Results:** The majority of respondents reported spending more time in NOEs since COVID-19 emerged, particularly early in the pandemic. Respondents reported doing so for restorative purposes, including stress relief, improved mental health, and improved

physical health. Relative accessibility of NOEs, both in terms of proximity and number of barriers to access, significantly impacted both time outdoors and the number of NOEs used. Access to safe, high-quality NOEs was not experienced equally across staff respondents; barriers to access tended to be higher among staff living with dependents or others in their household, and for staff who identify as non-White.

**Conclusion:** Spending time outdoors may have served as a protective factor for many university staff against some of the potentially detrimental effects of the pandemic, particularly reduced mental health and well-being. Universities can contribute to the ongoing well-being of their staff by supporting access to safe, high-quality NOEs on or adjacent to campus. This may also serve to reduce disparities in access to nature and experience of its benefits. Universities may also consider alternative work arrangements for staff to allow for more time for health and wellness self-care during the work day, including spending time outdoors in nature.

**Keywords:** nature, time outdoors, well-being, university staff, natural outdoor environments, COVID-19, restoration, stress

## INTRODUCTION

In early 2020, the world began to hear of a rapidly spreading virus. Within weeks, SARS-CoV-2 was identified as the highly contagious virus spread by airborne droplets causing COVID-19. Faced with a highly virulent and novel disease that placed a major strain on health systems, public health leaders took unprecedented actions to mitigate spread and keep populations healthy, including limiting numbers of people gathering together and lockdown scenarios.

Emergency public health measures affected many environments, including workplaces. For example, in mid-March 2020, all schools in New York State (NYS) were closed, and all non-essential workers were required to work from home (Johns Hopkins University and Medicine, 2021). In a moment, people's lives drastically and dramatically changed. School-aged children could no longer go to school, requiring at-home or alternative care arrangements. Workers, if deemed non-essential, needed to find ways to work from home, while also helping dependents to stay engaged in "on-line" learning. Those deemed essential needed to be at work, despite also being tasked with caring for dependents at home; a substantial burden and conundrum. Roughly one-third of employed individuals in the United States worked remotely during the pandemic (U.S. Bureau of Labor Statistics, 2021). The percentage of the population engaged in remote work varied widely across sociodemographic groups: those from households with higher income levels were more likely to work remotely, as were those with more education and in better health (Marshall et al., 2021). Those with lower-wage jobs had less freedom, greater health risks, and more pressures.

## Stress and Work

The workplace has long been viewed as a stressful environment, with worker stress most often associated with an inability to deal adequately with the demands placed upon the individual (Bhui et al., 2016). The novelty and uncertainty of COVID-19, and

the related changes in workplace schedules and environments, exacerbated already high levels of stress for many workers. A survey conducted in March, 2020 that found that 88% of workers reported experiencing moderate to extreme stress over the previous 4–6 weeks (Gavidia, 2021). Among those reporting stress, 62% noted losing at least 1 h per day in productivity and 32% lost at least 2 h per day due to COVID-19-related stress. While lockdowns were necessary to mitigate the spread of COVID-19 (Sault, 2020) and to reduce pressure on health care systems, other research suggested serious secondary impacts as people continued to be confined to their homes (Evanoff et al., 2020). In response to remote work, one study found that those employees performing work deemed "non-essential" during the crisis phase of the pandemic experienced a high prevalence of stress, anxiety, depression, work exhaustion, burnout, and worsened well-being approximately 4–5 weeks after work-from-home policies were implemented (Evanoff et al., 2020).

## Effects of Stress

Stress, caused by day-to-day activities, or traumatic events, has serious impacts on personal and public health and wellbeing. The COVID-19 pandemic has been identified as a traumatic event (Centers for Disease Control and Prevention, 2021). Whether infected with SARS-CoV-2 or not, people may have experienced increased feelings of uncertainty, anxiety, irritation, anger, or denial. In the short-term, people may feel tired, overwhelmed, burned out, sad, and even depressed; may lack motivation or experience insomnia (Marelli et al., 2021); and may display an inability to concentrate (Centers for Disease Control and Prevention, 2021). Eighteen months after the onset of the pandemic, 32% of surveyed adults indicated that they are sometimes so stressed by COVID-19 that they struggled to make basic decisions. Stress levels were especially high among parents with children under age 18, 47% of whom stated that both day-to-day and major decision making was more stressful than it was pre-pandemic (American Psychological Association, 2021). If left unaddressed, experiencing such stressors can lead

people to engage in unhealthy behaviors, such as increased use of alcohol, tobacco, or other drugs (Centers for Disease Control and Prevention, 2021). Elevated stress is also linked to chronic diseases such as heart disease and stroke (Science Daily, 2017). People with high levels of stress may struggle to attend to personal and family needs while working; managing a different workload and/or lacking access to tools and equipment needed to perform work can further exacerbate negative feelings (Nigam et al., 2020).

## Managing Stress by Spending Time Outdoors in Nature

Presently, many Americans do not have strong stress management skills or coping mechanisms. The American Psychological Association's (2021) "Stress in America" report found that 45% of young adults in their twenties and 50% of millennials said they do not know how to manage their stress due to the coronavirus pandemic (American Psychological Association, 2021). Adults were even less likely to feel that they are doing enough to manage their stress or to feel that their mental health was very good or excellent. In particular, Hispanic and Black adults were less likely to say they are faring well during the coronavirus pandemic than non-Hispanic White adults (American Psychological Association, 2021).

Considerable evidence has demonstrated that spending time outdoors in nature can be an effective way of managing stress and bolstering mental health. Humans derive both psychological and physiological benefits from accessing nature, including reductions in overall stress levels (Fan et al., 2008; Antonelli et al., 2019; Hunter et al., 2019); anxiety (Bratman et al., 2015); rumination (Bratman et al., 2012); and depression (Frumkin et al., 2017; Kondo et al., 2018).

However, despite the myriad benefits of time outdoors and in nature, not all populations have easy access to natural outdoor environments either at or near their home. Certain populations, including older adults and racial and ethnic minorities, lack the ability to easily access natural environments at or near home, or feel safe and welcomed in these settings (Rowland-Shea et al., 2020; Lockhart et al., 2021). Young people of color face a complex matrix of external, socioeconomic, and psychological barriers that limit their engagement with nature. Barriers to access involve factors such as work schedules or home responsibilities that preclude them from carving out time to spend in nature, or lack of access to natural outdoor environments with amenities that support their interests and are clean and well-maintained (Ibes et al., 2021). If time in nature is to be considered as a tool to support mental health and wellbeing in a systematic and equitable way, understanding barriers to access is key, as access is associated with the quality or frequency of outdoor experiences (Ibes et al., 2021).

## University Staff Managing During COVID-19

There is mounting evidence that job-related stress is particularly acute among staff members of colleges and universities. University employees, including general and academic staff, report that work is a significant cause of stress in their lives

(Gillespie et al., 2001; Kinman and Wray, 2013). University staff indicate that their level of stress is high or very high, and many experience levels of stress they find unacceptable (Kinman and Wray, 2013). Further, university employees report that job-related stress has had a deleterious impact on their professional work and personal welfare (Gillespie et al., 2001; Hogan et al., 2002). During COVID-19, university staff reported emergent challenges due to COVID-related social isolation: lack of personal interactions, lack of motivation, and anxiety, boredom and loneliness (Leal Filho et al., 2021). Even as COVID-19 restrictions are lifted, some university staff may continue to work remotely (Ellis, 2021).

As COVID-19 emerged, university staff in NYS were classified into essential or non-essential groups, and the work environment changed dramatically. This already highly stressed population faced new and variable stressors, depending on their living context. We anticipated that this drastic change would influence people differently, that new work expectations or locations might influence actions, and that different or new coping mechanisms may have been utilized to manage stress or uncertainty. In short, we hypothesized that during the pandemic, some people would be spending more time outdoors (as compared to pre-pandemic), and that they would be doing so to achieve some of the well-documented benefits: managing stress and bolstering mental health and wellbeing. Specifically, we sought to explore the degree to which staff were spending time in natural outdoor environments (NOEs) during the pandemic, and for what purpose. We also sought to determine whether and how their nature-based routines changed as a result of the emergence of COVID-19. We further hypothesized that some staff would experience barriers to spending time in NOEs, potentially limiting their ability to experience these beneficial effects.

To test our hypotheses, we engaged staff at a large university in New York state NYS. We specifically sought to explore (1) how much time staff spent outdoors during COVID-19 (as measured in Fall 2020), and if that differed from routines pre-COVID-19 (Fall 2019) or soon after COVID-19 emerged (Spring 2020); (2) what types of NOEs were used by staff during the pandemic vs. pre-COVID-19; (3) what types of outdoor activities staff engaged in and how that changed during COVID-19; and (4) motivations for spending time outdoors before and since the pandemic emerged. To better understand variations in or barriers to time outdoors, we explored differences in staff access to various types of NOEs, as well as in their home setting, work location, and race.

By understanding whether time outdoors in nature has been an intentional and valuable strategy for improved mental health during the pandemic, we hope to be able to raise awareness among employers, such as universities, about the benefits of facilitating time outdoors in nature among their employees, and the barriers which may need to be addressed to do so.

## MATERIALS AND METHODS

Data for this study were collected via an anonymous online survey distributed to staff in a large research university in NYS (student population ~ 25,000) in NYS. Between March 2020 and

July 2020 most staff were expected to work remotely from home. The time leading up to the study period (Fall 2020) remained a time of uncertainty related to COVID-19: vaccinations were not yet available, and the COVID-19-related mortality rate in the United States remained high. As the study was administered (November and December 2020), NYS had experienced close to one million cases, and COVID-19 rates were increasing (New York State, 2020). At the university where the study took place, a hybrid education model was in use which offered both online and in-person classes; only about 75% of students opted for in-person classes in Fall 2020. However, at this time an estimated 60% of staff were still working remotely from home.

The survey contained 28 questions related to access to NOEs, time spent outdoors in nature, types of outdoor activities in which staff engaged, reasons for spending time in nature, and perceived benefits of time in nature. For most questions respondents were asked to report on experiences and actions related to three time points: recent experience/mid-COVID (Fall 2020), pre-COVID (Fall 2019), and early-COVID (April–July 2020) or else activities and perceptions “before COVID-19 emerged” or “since COVID-19 emerged.” Staff were also asked to speak to outdoor access and routines both from home and while on campus; however, for the purpose of this paper only home-based routines were included for analysis. To stratify responses, staff answered 9 additional questions related to demographics, employment status, and home location. Survey questions were developed from other available tools, reviewed by context and evaluation experts, and then beta tested for validity. The final survey (**Supplementary Appendix 1**) comprised mostly multiple choice (single answer) and multiple response (check all that apply) questions, complemented by three open-ended short-answer questions; no questions were forced. After being vetted by Human Resources administrators, the survey was programmed into Qualtrics. As programmed, the survey took respondents approximately 10–15 min to complete.

The survey was open and accessible to staff from November 25 through December 31, 2020. An invitation and link to participate in the survey was distributed via an online “wellness” newsletter with a distribution list of ~7,000 staff members employed at the university’s primary campus. The survey invitation indicated that all participants would be entered in a drawing for one of 35 gift cards (value \$50). A total of 507 valid surveys were collected from staff members.

Means and standard deviations are reported for continuous data, percentages are presented for categorical data (R Core Team, 2021). Associations between two categorical variables were assessed using Fisher’s Exact Test. *T*-tests and ANOVAs were used to compare continuous measurements across groups. Paired *t*-tests were used to assess the within-subject change of continuous variables whereas McNemar’s test was used to assess the within-subject change of binary variables over the two time frames (before and since the emergence of COVID-19). Generalized linear mixed models with a binary distribution with a random effect of subject and a fixed effect of time were used to assess the overall difference of participation in outdoor activities and use of natural outdoor environments (NOEs) over the two time points. No control

**TABLE 1 |** Participant demographics.

	Proportion of participants (%) <i>n</i> = 507	Proportion of all staff (%)* <i>n</i> = 7420*
<b>Gender</b>		
<i>Female</i>	82	57
<i>Male</i>	16	43
<i>Other</i>	0.4	Unknown
<i>Prefer not to answer</i>	1.1	
<b>Race</b>		
<i>White</i>	78	85
<i>Non-White</i>	22	15
<b>Work location</b>		
<i>Remote</i>	50	60
<i>Hybrid</i>	38	Unknown
<i>On campus</i>	11	Unknown
<i>Other</i>	1	Unknown
<b>Position category</b>		
<i>Salaried</i>	54	48
<i>Hourly</i>	43	52
<i>Other</i>	3	Unknown
<b>Home setting</b>		
<i>Urban</i>	32	Unknown
<i>Suburban/Small town</i>	41	Unknown
<i>Rural</i>	27	Unknown
<b>Living arrangements</b>		
<i>Living alone</i>	5	Unknown
<i>Living with others</i>	95	Unknown

\*At the time of the study, Fall 2020.

variables were added to regression models. Pearson correlations were used to assess the relationship between continuous variables, whereas point-biserial correlations are reported for relationships between a continuous and binary variable. Data were analyzed using the complete variable data for individual hypotheses; no imputation was carried out to account for missing data (individual response rates are indicated in each table as appropriate). All analyses were completed using R (4.1.1 Kick Things; 2021).

## RESULTS

### Participants

A total of 507 valid surveys were collected from staff members (see **Table 1**). At the time of data collection in December 2020, 50% of respondents were still working fully remotely from home, 38% were splitting their time in some way between home and campus, and only 11% were working fully from campus (see **Table 1**). The participant sample was largely comprised of staff who identify as female (82%, compared to 57% of all university staff) and White (78%, compared to 85% of all staff). Just over half (54%) of participants were salaried employees, and 43% were hourly employees. Roughly one-third of participants came from each urban (32%), suburban/small town (41%), and rural home



**TABLE 2 |** Time spent outdoors in nature.

Time outdoors/ In nature	Home setting				p+	Work location				p+	Living arrangements			Race		
	All n = 507 (%)	Rural n = 121 (%)	Suburb/ Small town n = 184 (%)	Urban n = 143 (%)		Remote N = 246 (%)	Hybrid N = 184 (%)	On campus N = 52 (%)	Other N = 6 (%)		Live alone N = 24 (%)	Live with others N = 483 (%)	p	Non-white N = 113 (%)	White N = 394 (%)	p
<b>Average time outdoors per week</b>					0.014*					0.6			0.8			0.13
<b>Fall 2020</b>																
No days		0	0.5	2.1		0	2.2	1.9	0		0	1		1.9	0.8	
1 day	11	5	10	15		9.8	9.8	13	17		16	10		16	9.1	
2–3 days	27	30	28	26		27	26	27	33		32	27		26	27	
4–6 days	35	28	40	34		37	36	25	17		21	36		37	35	
7 days	27	35	21	24		26	26	33	33		32	27		19	29	
Staff spending 4+ days outdoors per week	62	65	61	57	0.4	63	62	58	50	0.9	53	62	0.8	56	63	0.2
<b>Average time spent outdoors per outing</b>	n = 494				0.014*					0.6			0.8			0.2
<b>Fall 2020</b>																
Less than 15 min	2	1.7	1.6	2.9		2.8	1.7	0	0		0	2.1		1.9	2	
15–30 min	17	12	13	26		17	14	16	50		25	17		23	15	
31 min – 1 h	48	45	55	45		48	50	41	17		44	48		40	50	
More than 1 h	34	41	30	26		32	34	43	33		31	34		35	33	
Staff spending 30+ min outdoors per outing	81	87	85	71	0.009**	84	84	50	80	0.6	75	81	0.8	75	83	0.13
<b>Time outdoors Spring 2020 (vs. Fall 2020)</b>	n = 499									0.9			0.8			0.13
Less time	16	1.7	2.7	2.8	0.4	17	15	12	33		6.2	2.5		20	15	
About the same time	34	16	13	22		35	33	38	17		31	16		32	34	
More time	47	37	33	31		46	49	48	50		19	34		42	49	
I don't know	2.6	45	52	45		2.8	2.7	1.9	0		44	48		5.7	1.8	
<b>Time outdoors Fall 2019 (vs. Fall 2020)</b>	n = 499				0.009**					0.6			0.8			0.13
Less time	40	55	32	36		41	52	33	37		31	40		32	42	
About the same time	2.2	1.7	2.2	2.1		1.6	1.9	0	2.8		0	2.3		3.8	1.8	
More time	34	31	38	34		30	21	33	40		44	34		32	35	
I don't know	24	13	28	27		27	25	33	20		25	24		31	22	

+Fisher's exact test across groups; adjusted p-values.

p-values: \*\*\* p &lt; 0.001; \*\*p &lt; 0.01; \*p &lt; 0.05.



community settings (27%). The vast majority (95%) were living with others in their household at the time of the study.

## Time Spent Outdoors in Nature

On average, respondents spent substantial time outdoors during the Fall of 2020; 88% reported spending time outdoors on two or more days per week on average, and 62% typically spent time outdoors on four or more days per week (see **Table 2**). Over 80% of respondents spent at least 30 min outdoors each day they were out; 98% reported spending at least 15 min outdoors on each day they spent time outdoors. While these proportions are high, almost half (47%) of respondents indicated that they spent even more time outdoors in the early days of the pandemic in Spring 2020 when the campus was largely closed and most respondents were working remotely. Reasons for this difference given by respondents included: the better weather conditions and increased daylight in the Spring compared to late Fall; the increased free time in their schedule because of reduced social activities (consequences of early pandemic lockdowns) and commuting time, and in some cases, lighter workloads; the need to get outdoors for exercise; and having a mental reset or a safe way to socialize with others. However, a portion of respondents (16%) spent less time outdoors early in the pandemic, citing ongoing fears associated with limited understanding of COVID-19 transmission, the lack of companions to spend time with outdoors, and limited access to nature.

While 40% of respondents indicated that they spent more time outdoors in Fall 2020 than same time the previous year before the pandemic emerged (Fall 2019), 34% of respondents spent less time outdoors than in Fall 2019. Respondents who were spending more time outdoors in Fall 2020 cited increased free time due to reduced commuting time or job changes or loss, as well as increased need for and appreciation of being outdoors in nature to support their mental health. Reasons for spending less time outdoors since the pandemic emerged included increased workload since the onset of COVID-19, avoiding crowds or other people due to ongoing fears around the virus, and mental health struggles which made it more difficult for some respondents to leave their homes.

Patterns in time outdoors also varied significantly depending on type of home community or home setting (see **Table 2**). Respondents living in rural and suburban/small town settings were more likely to spend at least 30 min outdoors each day out than respondents living in more urbanized areas ( $p = 0.014$ ), but there were no significant differences by home setting in the proportion who spent four or more days outdoors per week. Furthermore, time spent outdoors did not vary significantly for respondents working remotely versus those working on campus, or among those living on their own versus with others, or between White and non-White respondents.

There were no significant differences across any of the subgrouping examined for the time spent outdoors Fall 2020 versus Spring 2020 (see **Table 2**), suggesting similar changes in use across subgroups since the pandemic emerged. However, significantly more rural dwelling respondents (55%) indicated their time outdoors had increased when comparing Fall 2020 to

the previous Fall season (2019) than either suburban/small town (32%) or urban (36%) colleagues ( $p = 0.009$ ).

## Changes in Outdoor Activities

The most common outdoor activities both before and since the pandemic emerged were lower intensity activities (91%) such as walking, gardening, birdwatching or fishing, and these levels were stable over time both between and within participants (see **Table 3**). Approximately half of participants engaged in higher intensity activities, such as running, biking, rock climbing or kayaking, both before (52%) and since (48%) COVID-19 emerged; however, there was a significant decrease in such activities across all participants ( $p = 0.028$ ) since the pandemic began. Not surprisingly due to COVID-19-related restrictions, engagement in social activities (e.g., gathering or dining with others) significantly dropped since COVID-19 emerged ( $p < 0.001$ ). Restorative activities outdoors, however, such as resting, reading, or meditating significantly increased over pre-pandemic levels across all participants ( $p < 0.001$ ). Changes across all participants were mirrored by activity changes within individuals as well. There was a significant increase in restorative activities outdoors ( $p < 0.001$ ) and decreases in both social activities ( $p < 0.001$ ) and higher intensity ( $p = 0.05$ ) since the onset of COVID-19. Overall, there was a significant decrease in the average number of different types of outdoor activities in which respondents engaged ( $p < 0.001$ ) from 2.63 (SD = 1.05) to 2.42 (SD = 1.05).

## Changes in Use of Natural Outdoor Environments

Participants reported regularly using an average of 4.93 (SD = 2.26) different types of NOEs before the pandemic emerged (see **Table 4**). The most common spaces used pre-pandemic were NOEs at home: private or shared yards (85%) and decks, balconies or patios (76%). The most common public NOEs were nature/hiking trails (71%), rivers, streams, canals or waterfalls (61%), and public parks, gardens or orchards (56%). Across participants, use levels generally remained stable after the pandemic emerged, with no significant changes. Within subject changes mirrored those found across the participant sample. Individual respondents' use of for each type of NOE also remained quite stable. The average total of different types of NOEs used decreased slightly to 4.65 (SD = 2.29;  $p = 0.04$ ) from pre-COVID-19 levels (4.76; SD = 2.29) but the difference was not significant.

Considering differences in NOE use, patterns again differed across some respondent subgroups (see **Table 5**). Rural dwellers reported higher usage of private or shared yards than their suburban/small town and urban colleagues both before ( $p < 0.001$ ) and since ( $p = 0.031$ ) COVID-19 emerged, and urban respondents reported significantly higher use of public parks, gardens or orchards as well as rivers, streams, canals or waterfall areas both before ( $p < 0.001$ ) and since ( $p < 0.001$ ) the beginning of the pandemic. The usage of botanic gardens, arboreta and nature centers remained

**TABLE 3 |** Changes in types of outdoor activities.

Outdoor activity types	Across participants				Within participants			
	Regularly engaged in before COVID-19 emerged <i>n</i> = 507 (%)	Regularly engaged in since COVID-19 emerged <i>n</i> = 507 (%)	Odds ratio (95% CI)	p+	Engaged in before but not since <i>n</i> = 507 (%)	No change in engagement <i>n</i> = 507 (%)	Engaged in since but not before <i>n</i> = 507 (%)	p++
Social (e.g., gatherings or dining with others)	72	44	3.39 (2.58–4.47)	<0.001***	41	47	12	<0.001***
Lower intensity (e.g., walking, hiking, gardening, birdwatching, fishing)	91	91	1 (0.65–1.53)	1.0	4.7	91	4.7	1
Higher intensity (e.g., running, biking, rock-climbing, kayaking)	52	48	1.46 (1.07–1.98)	0.028*	11	81	7.1	0.05*
Restorative (e.g., resting, reading, meditating, sleeping)	45	57	0.36 (0.24–0.53)	<0.001***	4.5	79	16	<0.001***
Other	0.6	0.8	0.15 (0.002–11.4)	0.5	0.2	99	0.4	1
<b>Average number of types of outdoor activities (SD)</b>	<b>2.63 (1.05)</b>	<b>2.42 (1.05)</b>	<b>p+++ &lt; 0.001***</b>					

+Generalized linear mixed models across participants; adjusted *p*-values.

++McNemar's chi squared test within participants; adjusted *p*-values.

+++Paired *t*-test.

*p*-values: \*\*\**p* < 0.001; \*\**p* < 0.01; \**p* < 0.05.

**TABLE 4 |** Changes in the use of natural outdoor environments (NOEs).

Type of natural outdoor environments (NOE)	Across participants				Within participants			
	Use before COVID-19 emerged <i>n</i> = 507 (%)	Use since COVID-19 emerged <i>n</i> = 507 (%)	Odds ratio (95% CI)	p+	Used before but not since <i>n</i> = 507 (%)	No change in use <i>n</i> = 507 (%)	Used since but not before <i>n</i> = 507 (%)	p++
Private or shared yard	85	83	1.14 (0.82–1.6)	0.63	5.9	90	4.1	0.47
Deck, balcony, or patio	76	75	1.05 (0.79–1.4)	0.90	6.1	89	5.1	0.77
Public park, garden, or orchard	59	56	1.33 (0.94–1.88)	0.22	13	78	9.5	0.25
Botanical garden, arboretum, or nature center	36	31	1.55 (1.08–2.23)	0.10	13	78	8.3	0.09
Nature/Hiking trail	71	71	1 (0.68–1.47)	1	9.9	80	9.9	1
Woodland or conservation area	50	52	0.83 (0.61–1.13)	0.40	7.3	83	9.3	0.5
River, stream, canal, or waterfall	61	57	1.39 (0.94–2.05)	0.22	10	83	6.7	0.24
Lake, pond, or beach	51	47	1.52 (1.12–2.07)	0.08	10	84	5.7	0.09
Other	2.4	2.4	1 (0.45–2.25)	1	0.6	99	0.6	1
<b>Average number of NOEs used (SD)</b>	<b>4.93 (2.26)</b>	<b>4.76 (2.29)</b>	<b>p+++ = 0.13</b>					

+Generalized linear mixed models across participants; adjusted *p*-values.

++McNemar's chi squared test within participants; adjusted *p*-values.

+++Paired *t*-test. *p*-values: \*\*\**p* < 0.001; \*\**p* < 0.01; \**p* < 0.05.

**TABLE 5 |** Differences in natural outdoor environment (NOE) use by subgroups.

Type of NOE	Time point	Home setting				Work location					Living arrangements			Race		
		Rural	Suburb /Small town	Urban	p+	Remote	Hybrid	On campus	Other	p+	Live alone	Live with others	p+	Non-White	White	p+
		n = 121 (%)	n = 184 (%)	n = 143 (%)		n = 246 (%)	n = 184 (%)	n = 52 (%)	n = 6 (%)		n = 24 (%)	n = 483 (%)		n = 113 (%)	n = 394 (%)	
Private or shared yard	Before	97	88	78	<0.001***	87	84	87	100	0.9	58	86	0.022*	72	89	<0.001***
	Since	93	85	78	0.031**	83	85	87	83	>0.9	58	84	0.033*	70	87	<0.001***
Deck, balcony or patio	Before	80	79	71	0.33	76	77	75	67	0.9	58	76	0.167	65	79	0.022*
	Since	76	77	74	0.9	72	79	77	83	0.6	58	75	0.218	65	77	0.051
Public park, garden or orchard	Before	50	54	73	<0.001***	60	60	60	67	>0.9	33	61	0.06	62	59	0.7
	Since	43	49	76	<0.001***	58	56	48	33	0.6	42	57	0.37	56	56	>0.9
Botanical garden, arboretum, or nature center	Before	29	36	40	0.33	33	39	44	50	0.6	29	37	0.61	37	36	0.84
	Since	17	30	41	<0.001***	29	34	33	0	0.6	29	31	>0.9	35	30	0.52
Nature/Hiking trail	Before	71	70	71	>0.9	70	71	79	100	0.6	50	72	0.13	65	72	0.29
	Since	69	75	71	0.67	69	74	71	67	0.88	58	71	0.37	60	74	0.035*
Woodland or conservation area	Before	63	42	48	0.005**	46	55	54	50	0.6	38	51	0.37	44	52	0.29
	Since	61	47	51	0.13	48	60	52	17	0.31	42	53	0.47	43	55	0.103
River, stream, canal, or waterfall	Before	60	54	69	0.07	58	64	63	50	0.8	54	61	0.61	54	62	0.26
	Since	57	51	68	0.036*	55	62	56	33	0.53	50	58	0.61	49	60	0.103
Lake, pond, or beach	Before	54	51	48	0.89	48	53	60	33	0.6	54	51	0.88	50	52	0.84
	Since	53	44	43	0.33	46	51	40	17	0.53	58	47	0.47	44	48	0.61
Other	Before	2.5	1.6	2.8	0.9	2.8	1.1	3.8	17	0.4	4.2	2.3	0.59	4.4	1.8	0.29
	Since	2.5	1.6	2.8	0.9	2	2.2	5.8	0	0.6	0	2.5	>0.9	3.5	2	0.41

(Continued)

TABLE 5 | (Continued)

Type of NOE	Time point	Home setting			Work location				Living arrangements			Race				
		Rural	Suburb /Small town	Urban	p+	Remote	Hybrid	On campus	Other	p+	Live alone	Live with others	p+	Non-White	White	p+
Average total number of NOEs used (SD)	Before	5.12 (2.01)	4.76 (2.11)	5.01 (2.40)	0.45++	4.82 (2.17)	5.06 (2.24)	5.27 (2.31)	5.33 (1.75)	0.71++	3.79 (3.05)	4.98 (2.20)	0.06++	4.54 (2.65)	5.04 (2.12)	0.103++
	Since	4.77 (2.14)	4.61 (2.17)	5.05 (2.24)	0.33++	4.62 (2.28)	5.05 (2.14)	4.71 (2.31)	3.33 (2.16)	0.40++	3.96 (3.11)	4.80 (2.23)	0.22++	4.26 (2.71)	4.90 (2.13)	0.035++
	p+++	0.13	0.45	0.90		0.4	0.97	0.32	0.24		0.78	0.13		0.26	0.28	

+Fisher's exact test across groups; adjusted *p*-values.++ANOVA; adjusted *p*-values; adjusted *p*-values.+++Paired *t*-test Before vs. Since; adjusted *p*-values.*p*-values: \*\*\**p* < 0.001; \*\**p* < 0.01; \**p* < 0.05.

stable among urban respondents, but decreased among both rural and suburban/small town dwellers from pre-COVID-19 levels. The average number of different NOEs used by rural and suburban/small town respondents decreased slightly since COVID-19 emerged, but otherwise there were no significant differences in the average total number of NOEs used before or after COVID-19 emerged based on the type of home setting.

There were also no significant differences in the use of each type of NOE nor the average number of NOEs used across respondent groups working remotely versus on-campus or some hybrid of the two. However, the average number of different NOEs used by both remote on-campus respondents decreased slightly since the emergence of the pandemic. Only a small proportion of respondents reported living alone at the time of the survey, but those who did used private or shared yards much less than those with others in their household both before ( $p = 0.022$ ) and since the pandemic ( $p = 0.033$ ). Those living alone also generally reported less time on average in each NOE type than their colleagues with others in their households, but the mean number of NOEs used increased slightly since the onset of COVID-19 (3.79 (SD = 3.05) to 3.96 (SD = 3.11), partially closing the gap in use compared to colleagues living with others.

Respondents identifying as White used NOEs at home (e.g., private or shared yards, decks, balconies) significantly more than non-White respondents both before ( $p < 0.001$ ) and since ( $p < 0.001$ ) the pandemic (see **Table 5**). While both groups showed an overall slight decrease in the average number of NOEs used since the pandemic, each group's levels of use for each type of NOE remained fairly stable. The exception was that non-White respondents decreased their use of nature/hiking trails since COVID-19 emerged, making their use of this NOE significantly less than White respondents ( $p = 0.035$ ). White respondents used a greater diversity of NOEs on average than non-White respondents both before and since the pandemic, but this gap increased to a significant level ( $p = 0.035$ ) with the onset of COVID-19.

## Changes in Motivations for Spending Time Outdoors

Before COVID-19 emerged, a high proportion of respondents indicated they spent time outdoors for exercise or to improve their physical health (86%), for fun or recreation (85%), and for stress relief or improved mental health (78%) (see **Table 6**). The average number of different reasons for spending time outdoors did not significantly change once the pandemic emerged, however, there was a significant increase in the overall number of respondents choosing to spend time outdoors to support their mental health (87%;  $p < 0.001$ ). Spending time outdoors to socialize with friends and for fun or recreation also decreased since the pandemic, but these differences were not significant. These trends were also reflected in changes within individuals: more respondents reported choosing to spend time outdoors for improved mental health since the onset of COVID-19, and fewer chose to spend time outdoors for fun or to socialize with friends.

## Factors Influencing Time Spent Outdoors and Use of Natural Outdoor Environments

Several factors appeared to impact the amount of time respondents spent outdoors since the emergence of the pandemic as well as respondents use of NOEs. Respondents who indicated they generally experience more positive feelings after spending time outdoors were significantly more likely to spend more time outdoors per week ( $p < 0.001$ ; 95% CI: 0.04–0.22) and for longer durations on each outing ( $p < 0.001$ ; 95% CI: 0.12–0.29). Similarly, positive feelings after time outdoors were correlated with respondents' use of NOEs both before ( $p < 0.001$ ; 95% CI: 0.07–0.24) and since ( $p < 0.001$ ; 95% CI: 0.03–0.21) COVID-19 emerged (see **Table 7**).

When asked about the NOEs which were accessible to them both at and near their home (within a 10 min walk of home), respondents with higher quantity of NOEs for both at ( $p < 0.001$ ; 95% CI: 0.15–0.32) and near home ( $p < 0.001$ , 95% CI: 0.14–0.31) were more likely to spend time outdoors on four or more days per week. Similarly, those with higher diversity of NOEs nearby (i.e., 3 or more different types of NOEs within a 10 min walk of home) were also significantly more likely to spend time outdoors on four or more days per week ( $p < 0.001$ , 95% CI: 0.11–0.28), but were also more likely to spend more than 30 min outdoors each outing ( $p = 0.006$ ; 95% CI: 0.04–0.21). Access to and diversity of NOEs both at and near home were also highly correlated with use of NOEs both before and since the pandemic emerged (see **Table 7**).

The total number of barriers to accessing nature was also highly correlated with time outdoors and use of NOEs. The more barriers to accessing natural outdoor environments near home reported by respondents, the lower the time spent outdoors in both frequency ( $p < 0.001$ ; 95% CI:  $-0.32$  to  $-0.15$ ) and duration ( $p = 0.001$ ; 95% CI:  $-0.23$  to  $-0.06$ ). The number of perceived barriers to accessing natural environments from home also influenced use of NOEs before the pandemic ( $p = 0.023$ ; 95% CI:  $-0.19$  to  $-0.01$ ) but not since ( $p = 0.36$ ).

## Differences in Accessibility of Natural Outdoor Environments by Subgroups

The majority of respondents reported high access to NOEs at home via a private or shared yard (91%), or a private or shared deck, balcony or patio (80%) (see **Table 8**). For NOEs near home (within a 10-min walk), respondents could access an average of 2.92 (out of 7 options; SD = 1.69) different types of NOEs and 60% of all respondents reported nearby access to at least three different types of NOEs. Sixty percent or more reported easy access to public parks, nature trails, and rivers or streams.

There were significant differences in access to NOEs both at and near home by respondents living in different community settings. Fewer urban respondents reported having access to private or shared yards at home ( $p < 0.001$ ) than respondents living in either rural or suburban/small town areas. Rural respondents reported significantly more access to NOEs such as woodlands ( $p < 0.001$ ) and lakes, ponds or beaches ( $p = 0.008$ ). Urban dwelling respondents reported significantly more access

to public parks or gardens ( $p < 0.001$ ) than suburban/small town and rural respondents.

The only significant difference in access to different types of NOEs by racial groups was the availability of outdoor spaces at home; non-White respondents reported significantly less access to private or shared yards than White respondents ( $p < 0.001$ ), as well as water features such as rivers, streams, canals or waterfalls ( $p = 0.04$ ). There were no significant differences between racial groups in the total number or diversity of NOEs near home.

When asked what features or conditions prevent or limit participants' ability to spend time outdoors in nature when at home, including when working from home, respondents reported an average of 1.11 total barriers (SD = 0.97) (see **Table 9**). By far the most commonly cited barrier by all respondents was lack of time (51%), followed by having no one with whom to spend time outdoors (14%) and unfavorable environmental conditions (14%). A portion of respondents (7.7%) felt that NOEs near to their home felt unsafe or unwelcoming. When considering differences in barriers experienced across different respondent subgroups, there were no significant differences in the types of barriers experienced across different home settings. Urban dwelling respondents reported more total barriers on average than either rural or suburban/small town respondents, but these differences were not significant. Respondents with others living in their household reported a much higher average number of barriers to accessing natural environments ( $p < 0.001$ ), and were more likely to report a lack of time ( $p < 0.001$ ) as a barrier to spending time outdoors. Across racial subgroups, more non-White respondents reported that they do not have easy access to natural outdoor environments and that nearby NOEs feel unsafe or unwelcoming, but these differences were not significant. There was little differences in the total number of barriers reported across racial groups.

## DISCUSSION

Employees in the United States experience high levels of stress due to their work and often feel ill equipped to manage these pressures (Liu, 2021). Work-related stress is of growing concern to employers because it has significant economic implications for organizations through employee dissatisfaction, reduced productivity, and lowered emotional and physical health (Kalia, 2002; Mirela and Madalina-Adriana, 2011). Millions of workdays are lost due to stress, anxiety, and depression-related illness (HSE, 2015).

During the changes and uncertainties presented by the COVID-19 pandemic, work expectations and environments shifted, as did non-work responsibilities as schools and daycares closed. Levels of stress increased, leaving many people at risk of short- and long-term stress-related illness. Staff members at institutions of higher learning report experiencing stress, anxiety and depression at even higher rates than the general United States workforce (Leal Filho et al., 2021).

Workplaces may choose to invest in practices that have been proven to reduce stress and anxiety. One well-researched stress management intervention is the use of natural outdoor



**TABLE 6** | Changes in motivations for spending time outdoors in nature.

Motivations for spending time outdoors	Between subjects change				Within subjects change			
	Motivation before COVID-19 emerged <i>n</i> = 507 (%)	Motivation since COVID-19 emerged <i>n</i> = 507 (%)	Odds ratio (95% CI)	p+	Motivation before but not since <i>n</i> = 507 (%)	No change in motivation <i>n</i> = 507 (%)	Motivation Since but not before <i>n</i> = 507 (%)	p++
For exercise/Improved physical health	86	86	0.98 (0.69–1.41)	1	4.7	90	4.9	1
For stress relief/Improved mental health	78	87	0.51 (0.37–0.72)	0.001***	4.1	82	14	<0.001***
For fun/Recreation	85	80	1.36 (0.98–1.88)	0.268	9.5	85	5.1	0.049*
To have contact with nature	74	75	0.94 (0.71–1.25)	1	4.5	90	5.7	0.68
To spend time with family	58	59	0.95 (0.74–1.22)	1	11	76	12	0.76
To socialize with friends	61	55	1.29 (1–1.65)	0.246	23	60	17	0.084
To Do yard/Farm work	1.2	1.2	1 (0.32–3.12)	1	0	100	0	n/a
To garden	0.6	0.6	1 (0.20–4.98)	1	0	100	0	n/a
To care for animals	3.2	3.2	1 (0.50–2.02)	1	0	100	0	n/a
For other work-related activities	1.2	0.6	2.01 (0.5–8.09)	0.975	1	99	0.4	0.68
Other	0.4	0.6	0.67 (0.11–4)	1	0	100	0.2	1
<b>Mean number of total motivations mean (SD)</b>	<b>4.48 (1.60)</b>	<b>4.50 (1.65)</b>	<b>p+++ = 1 (–0.12–0.14)</b>					

+Generalized linear mixed models across participants; adjusted *p*-values.

++McNemar's chi squared test within participants; adjusted *p*-values.

+++Paired *t*-test.

*p*-values: \*\*\**p* < 0.001; \*\**p* < 0.01; \**p* < 0.05.

environments (NOEs). As little as 10-min of time outdoors in nature has been shown to have a significant positive effect on psychological and physiological markers of mental well-being, including heart rate, blood pressure, salivary cortisol levels, mood, affect, happiness, stress, and attention (Meredith et al., 2019). Our study found that the majority of staff members spent more time outdoors in Spring 2020 when COVID first emerged than in Fall 2020, but that time outdoors in both periods in 2020 was greater for most than in Fall 2019, before the onset of the pandemic. Respondents reported spending time in NOEs for many reasons, including for exercise, to improve their physical health, and for enjoyment or recreation. However, the motivation which showed the most significant increase during COVID-19 was the self-identified use of NOEs for stress relief or improved mental health. The majority of respondents also identified that that they generally feel happier, less stressed, less anxious, and refreshed after spending time outdoors in nature. These results further reinforce the strong correlation between these positive feelings and higher reported levels of outdoor time and NOE usage and are consistent with other studies which demonstrated

that contact with nature helped people cope with COVID-related challenges, especially for those under strict lockdown (Samuelsson et al., 2020; Venter et al., 2020; Pouso et al., 2021).

Compared to pre-COVID-times, many more respondents reported that their specific outdoor activities were of a restorative nature, such as resting, reading, meditating, and sleeping. These results suggest that many staff recognize both the restorative qualities and stress-relief benefits of time in nature, and that many intentionally used natural outdoor environments as a positive stress coping mechanisms during the pandemic. This finding is similar to a recent study showing English residents visited nature sites in unprecedented numbers during the COVID crisis, reportedly to help with their mental wellbeing and ability to cope (Robinson et al., 2021).

Because of concerns regarding the transmission of the virus from persons in close proximity, social outings in NOEs saw the greatest decline among staff respondents during the pandemic. These findings align with a study of nearly 5,000 Vermont residents early in the pandemic. They too showed increased participation in most outdoor activities except for camping

**TABLE 7 |** Factors influencing time spent outdoors and use of NOEs.

Factor	Time spent outdoors Fall 2020		Use of NOEs	
	Spent 4+ days outdoors <i>r</i> , (95% CI), <i>p</i> +	Spent 30+ min outdoors per outing <i>r</i> , (95% CI), <i>p</i> +	Total NOEs used before COVID-19 emerged <i>r</i> , (95% CI), <i>p</i> +	Total NOEs used since COVID-19 emerged <i>r</i> , (95% CI), <i>p</i> +
<b>Feel after total score</b>	<i>r</i> = 0.13 (0.04, 0.22), <i>p</i> = 0.004**	<i>r</i> = 0.20 (0.12, 0.29), <i>p</i> < 0.001***	<i>r</i> = 0.16 (0.07, 0.24), <i>p</i> < 0.001***	<i>r</i> = 0.12 (0.03, 0.21), <i>p</i> < 0.001***
Happier	<i>r</i> = 0.10 (0.01, 0.19), <i>p</i> = 0.024*	<i>r</i> = 0.13 (0.05, 0.22), <i>p</i> = 0.002**	<i>r</i> = 0.15 (0.06, 0.24), <i>p</i> < 0.001***	<i>r</i> = 0.09 (0.005, 0.18), <i>p</i> = 0.039*
Healthier	<i>r</i> = 0.09 (0.003, 0.18), <i>p</i> = 0.042*	<i>r</i> = 0.18 (0.09, 0.27), <i>p</i> < 0.001***	<i>r</i> = 0.15 (0.06, 0.23), <i>p</i> = 0.001**	<i>r</i> = 0.12 (0.03, 0.21), <i>p</i> = 0.007**
Less stressed/Anxious	<i>r</i> = 0.12 (0.03, 0.21), <i>p</i> = 0.008**	<i>r</i> = 0.18 (0.09, 0.26), <i>p</i> < 0.001***	<i>r</i> = 0.14 (0.05, 0.22), <i>p</i> = 0.002**	<i>r</i> = 0.09 (0.003, 0.18), <i>p</i> = 0.041*
More focused	<i>r</i> = 0.15 (0.06, 0.24), <i>p</i> = 0.001**	<i>r</i> = 0.19 (0.10, 0.27), <i>p</i> < 0.001***	<i>r</i> = 0.12 (0.03, 0.20), <i>p</i> = 0.011*	<i>r</i> = 0.12 (0.03, 0.21), <i>p</i> = 0.010*
Refreshed	<i>r</i> = 0.06 (−0.02, 0.15), <i>p</i> = 0.168	<i>r</i> = 0.15 (0.07, 0.24), <i>p</i> < 0.001***	<i>r</i> = 0.15 (0.06, 0.23), <i>p</i> = 0.001**	<i>r</i> = 0.10 (0.01, 0.19), <i>p</i> = 0.031*
<b>Accessibility of NOEs at/ near home</b>				
Total no. of NOEs can access from home	<i>r</i> = 0.282 (0.2, 0.36), <i>p</i> = < 0.001***	<i>r</i> = 0.083 (−0.01, 0.17) <i>p</i> = 0.065	<i>r</i> = 0.50 (0.43, 0.56), <i>p</i> < 0.001***	<i>r</i> = 0.49 (0.43, 0.56), <i>p</i> < 0.001***
Total no. of NOEs at home (e.g., private or shared yard)	<i>r</i> = 0.235 (0.15, 0.32), <i>p</i> = < 0.001***	<i>r</i> = 0.029 (−0.06, 0.12), <i>p</i> = 0.1	<i>r</i> = 0.41 (0.33, 0.48), <i>p</i> < 0.001***	<i>r</i> = 0.33 (0.25, 0.41), <i>p</i> < 0.001***
Total no. of NOEs near home (beyond home within 10 min walk)	<i>r</i> = 0.228 (0.14, 0.31), <i>p</i> = < 0.001***	<i>r</i> = 0.08 (−0.01, 0.17), <i>p</i> = 0.076	<i>r</i> = 0.41 (0.34, 0.48), <i>p</i> < 0.001***	<i>r</i> = 0.43 (0.36, 0.50), <i>p</i> < 0.001***
Access to 3 or more NOEs near home (within 10 min walk)	<i>r</i> = 0.199 (0.11, 0.28), <i>p</i> = < 0.001***	<i>r</i> = 0.124 (0.04, 0.21), <i>p</i> = 0.006**	<i>r</i> = 0.30 (0.22, 0.37), <i>p</i> < 0.001***	<i>r</i> = 0.33 (0.25, 0.41), <i>p</i> < 0.001***
<b>Total no. of barriers to NOE access from home</b>	<i>r</i> = −0.24 (−0.32, −0.15), <i>p</i> = < 0.001***	<i>r</i> = −0.15 (−0.23, −0.06), <i>p</i> = 0.001**	<i>r</i> = −0.10 (−0.19, −0.01), <i>p</i> = 0.023*	<i>r</i> = −0.05 (−0.13, 0.05) <i>p</i> = 0.36
No barriers	111/144 (77%)	127/141 (90%)		
1	127/207 (61%)	164/205 (80%)		
2	55/109 (50%)	81/108 (75%)		
3+	17/42 (40%)	29/40 (72%)		

+Pearson correlation.

*p*-values: \*\*\**p* < 0.001; \*\**p* < 0.01; \**p* < 0.05.

and socializing with others, presumably in response to COVID restrictions (Morse et al., 2020). Analysis of changes in the levels of use or types of NOEs used by participants since the pandemic versus before its onset reveal that staff did not significantly increase or decrease their use of any particular NOE, but rather that many just used their habitual NOEs more frequently. This is in contrast to a study of residents of Freiberg, Germany, who noted that urban forests took on much greater importance for them during COVID-19, with many indicating that the forests had taken the place of public squares as social gathering sites (Weinbrenner et al., 2021).

Results, however, unequivocally illustrated that relative accessibility of NOEs significant impacted both the time staff spent outdoors and the number of NOEs used. The presence and diversity of outdoors spaces both at and near home were significant facilitators of the number of days staff spent outdoors in Fall 2020 and their overall use of NOEs. However, barriers to access were not limited to physical proximity. Other impediments included: social and environmental barriers, including lack of time, lack of companions to spend time with, unfavorable

environmental conditions, and that local NOEs felt unsafe. These findings provide important insights that can inform targeted intervention strategies which both educational institutions and community planners can utilize to increase the ease and comfort with which employees and citizens can spend restorative time outdoors in nature.

Study findings also reinforce that lack of and barriers to access to outdoor green spaces are not experienced equally across staff respondents. Urban staff members had less access to outdoor spaces such as home yards or decks/patios yet greater access to public parks and gardens than staff living in rural or suburban/small town areas, reflecting the differences in land use planning, density and pedestrian networks available in differing community settings. Urban staff also faced more overall barriers to accessing NOEs than their colleagues. These findings emphasize that the home community setting where staff living can significantly impact the quantity and types of NOEs to which they have access, as well as the barriers to spending regular time outdoors, particularly for those who may continue to work from home. Increased break time and flexibility during the workday

**TABLE 8 |** Differences in accessibility of NOEs at and near home by all participants and home setting and racial subgroups.

Types of NOEs	All  <i>n</i> = 507 (%)	Home setting				Race		
		Rural <i>n</i> = 121 (%)	Suburb/Small town <i>n</i> = 184 (%)	Urban <i>n</i> = 143 (%)	<i>p</i> +	Non-White <i>n</i> = 113 (%)	White <i>n</i> = 394 (%)	<i>p</i> +
Private or shared yard	91	99	93	85	<0.001***	79	94	<0.001***
Deck, balcony, or patio	80	80	85	76	0.20	76	82	0.33
Public park, garden or orchard	59	35	57	83	<0.001***	65	57	0.33
Botanical garden, arboretum or nature center	15	7.4	18	15	0.056	22	13	0.08
Nature/Hiking trail	69	68	68	69	>0.9	68	70	0.87
Woodland or conservation area	49	61	46	38	<0.001***	45	50	0.52
River, stream, canal or waterfall	60	64	55	65	0.20	49	63	0.039
Lake, pond, or beach	36	48	32	29	0.008**	36	36	>0.9
Other	2	2.5	1.6	2.1	>0.9	3.5	1.5	0.33
<b>Total NOEs (at or near home; 0–9 options) mean (SD)</b>	<b>4.64 (1.84)</b>	<b>4.70 (1.79)</b>	<b>4.58 (1.82)</b>	<b>4.64 (1.70)</b>	<b><i>p</i>++ = 0.9</b>	<b>4.44 (2.13)</b>	<b>4.69 (1.75)</b>	<b><i>p</i>+++ = 0.33</b>
<b>Total NOEs at home (0–2 options) mean (SD)</b>	<b>1.71 (0.56)</b>	<b>1.79 (0.43)</b>	<b>1.79 (0.46)</b>	<b>1.61 (0.64)</b>	<b><i>p</i>++ = 0.008**</b>	<b>1.55 (0.71)</b>	<b>1.76 (0.49)</b>	<b><i>p</i>+++ = &lt; 0.001***</b>
<b>Total NOEs near home (within 10 min walk; 0–7 options) mean (SD)</b>	<b>2.92 (1.69)</b>	<b>2.91 (1.70)</b>	<b>2.79 (1.78)</b>	<b>3.03 (1.48)</b>	<b><i>p</i>++ = 0.52</b>	<b>2.89 (1.78)</b>	<b>2.93 (1.66)</b>	<b><i>p</i>+++ = 0.87</b>
<b>3 or more NOEs available near home (within 10 min walk)</b>	<b>60%</b>	<b>59%</b>	<b>55%</b>	<b>65%</b>	<b><i>p</i>++ = 0.29</b>	<b>57%</b>	<b>61%</b>	<b><i>p</i>+++ = 0.52</b>

+Fisher's exact test across groups; adjusted *p*-values.++ANOVA, adjusted *p*-values.+++Paired *t*-test, adjusted *p*-values.*p*-values: \*\*\**p* < 0.001; \*\**p* < 0.01; \**p* < 0.05.

could help to minimize barriers to spending time in NOEs for both home and campus-based staff. For staff who have or are transitioning back to campus-based work, some of these gaps could be minimized by increasing opportunities for staff to spend time outdoors in nature during their workday on campus.

Additionally, non-White staff reported having less access to NOEs at home than did White staff, and generally spent less time in NOEs than did their White colleagues. This may have been due to various barriers non-White study participants experience or perceive, such as living farther from NOEs, lacking convenient transportation to travel to such sites, or feeling less safe or unwelcome when in parks or woodlands. This finding adds to well-documented disparities regarding green access for Black, Indigenous and People of Color (BIPOC) versus White individuals (Hong and Anderson, 2006; Byrne, 2012; Rigolon and Németh, 2018; Borunda, 2020).

The great majority (95%) of respondents were living with others in their household during the pandemic, and they reported facing greater overall barriers to use of NOEs than did those

living alone, particularly noting lack of enough time, which may be related to home responsibilities associated with dependents. Identifying subgroups of employees who have less access to NOEs, or who face more barriers to spending time outdoors, can also help guide directed efforts to encourage and support time outdoors. Large-scale employers such as universities can also minimize these disparities by providing easy access to diverse, safe outdoors spaces on the property and encouraging regular time outdoors during the workday via shifts in institutional culture and policies.

Generally, individual staff perceptions about their outdoor experiences strongly correlated to the frequency and duration of those experiences. Those that identified higher positive feelings after time outdoors spent more days and more time outdoors during each outing, and also used a greater diversity of NOEs. Conversely, the more barriers to accessing nature individuals noted, the less time in frequency and duration they spent outdoors and the fewer NOEs they used. Since spending time in nature, unlike having adequate food and shelter, is not an

**TABLE 9 |** Differences in barriers to accessing NOEs for all participants and home setting, living arrangement and racial subgroups.

What prevents or limits ability to spent time outdoors in nature during free time	All		Home setting				Living arrangements			Race		
			Rural	Suburb /Small town	Urban	p+	Live alone	Live with others	p+	Non-White	White	p+
	n = 507 (%)	n = 121 (%)	n = 184 (%)	n = 143 (%)			n = 24 (%)	n = 483 (%)		n = 113 (%)	n = 394 (%)	
Don't have enough time	51	51	49	57	0.3		8.3	53	<0.001***	50	51	0.86
Don't have easy access to nature	5.9	3.3	4.9	9.8	0.069		4.2	6	>0.9	11	4.6	0.15
Nearby NOEs feel unsafe or unwelcoming	7.7	5.8	6.5	11	0.2		4.2	7.9	>0.9	14	5.8	0.112
I have no one to go with; engage in outdoor activities with	14	12	15	17	0.4		0	15	0.14	18	13	0.56
Lack of daylight	6.7	8.3	9.2	4.2	0.2		4.2	6.8	>0.9	3.5	7.6	0.49
Workload	1	0	1.1	2.1	0.4		0	1	>0.9	0	1.3	0.82
Physical health issues	2.2	2.5	1.6	2.1	>0.9		0	2.3	>0.9	2.7	2	0.82
Mental health issues	1	0.8	1.1	1.4	>0.9		0	1	>0.9	0	1.3	0.82
Family responsibilities	3.6	5	3.8	3.5	0.9		0	3.7	>0.9	1.8	4.1	0.7
Prefer/Reliant on indoor/Digital activities	0.4	0	0.5	0	>0.9		0	0.4	>0.9	0.9	0.3	0.7
Unfavorable environmental conditions	14	13	16	16	0.8		0	15	0.14	8	16	0.15
Lack of motivation	1.4	1.7	0.5	2.8	0.3		0	1.4	>0.9	0	1.8	0.7
Other barriers	1.8	0	1.6	4.2	0.043		0	1.9	>0.9	0.9	2	0.82
<b>Mean total barriers mean (SD)</b>	<b>1.11 (0.97)</b>	<b>1.03 (0.87)</b>	<b>1.11 (0.91)</b>	<b>1.32 (1.09)</b>	<b>p++ = 0.28</b>		<b>0.21 (0.51)</b>	<b>1.15 (0.96)</b>	<b>p+++ &lt; 0.001***</b>	<b>1.10 (1.00)</b>	<b>1.11 (0.96)</b>	<b>p+++ &gt; 0.9</b>

+Fisher's exact test across groups; adjusted p-values.

++ANOVA, adjusted p-values.

+++Paired t-test, adjusted p-values.

p-values: \*\*\*p &lt; 0.001; \*\*p &lt; 0.01; \*p &lt; 0.05.

essential human need, any physical or perceptual barriers can inhibit individuals' use of NOEs and the benefits they provide.

Encouragingly, results from this study indicate that a large proportion of staff surveyed are proactively spending time in natural outdoor environments to support their health, in particular their mental well-being. With a large number of staff noting relatively easy access to nature and intentionally choosing to spend time outdoors to improve their mental health, spending time outdoors likely served as a protective factor for many staff against some of the potentially detrimental effects of the pandemic. COVID-related restrictions which made indoor gathering difficult may also have raised awareness among staff about the benefits of nature as well as the natural resources available to them nearby. However, a significant portion of staff noted they had difficulties accessing or spending time in nature, and this was particularly true for those living with dependents and others in their household, and BIPOC staff.

## Limitations and Future Research

The authors recognize a number of limitations related to this study. First, the number of survey respondents (507) represents

a relatively small sample from a single institution. This might limit external generalizability. Second, the sample represents a small proportion of all invited to respond (7% of people on the newsletter distribution list). The sample represents a higher-than expected proportion of female respondents, when compared to the overall staff population. Furthermore, individuals who responded to the survey self-selected to participate, and may be biased toward physical activity and time outdoors, as the survey invitation was distributed via a wellness newsletter. Also to note is that while the proportion of non-White staff respondents was higher than the total percentage of non-White staff at this university, we should be cautious of generalizing actions and attitudes of non-White staff members based on the small sample, particularly as analysis required the clustering of all non-White staff members, which in turn may cloak differences in behaviors and perceptions across different racial or ethnic groups. These issues may therefore reduce the applicability of findings to the full staff community. Finally, the survey looked to measure change, but was only administered at one time point (November–December 2020), and respondents were asked to compare current actions and activities to those months

(April–July 2020) and a year (Fall 2020) ago. Recall bias might have influenced the results.

It is also important to note that while we were interested in the use of time in nature to manage stress and mental health, we intentionally avoided asking direct questions to staff in the survey about their mental health. We judged that the greater sensitivity and invasiveness of such questions would lead to higher levels of discomfort and lack of privacy and would likely result in lower response rates. This strategy precluded the analysis from directly correlating time outdoors with improved mental health. However, responses to several questions related to motivations for spending time in NOEs, and how staff felt after time outdoors, suggest that this would likely be the case. Future work could attempt to solicit these data in order to tie these outcomes more explicitly together.

The strong relationships between motivations for and feelings after spending in nature, and time spent outdoors in natural outdoor environments, suggests that facilitating time outdoors in nature among staff may result in both healthier workforces and workplaces. In a post-COVID era, we recommend that future research focus on the use of NOEs by staff at large institutions such as universities during regular work hours to examine impacts on staff health and performance. For example, do institutions with greater numbers of and more diverse NOEs see lower rates of job dissatisfaction, psychological problems, employee stress and burnout? Can the scheduling of employee breaks in green settings increase productivity or feelings of loyalty to the institution? Do staff members who increase their time in NOEs during the workday display changes to their overall environmental attitudes? Future research could also dig more deeply into the complexities of staff use and perceptions of nature and outdoor environments, and further unpack the diverse and nuanced barriers which can limit employees' abilities to leverage time outdoors in nature as a coping and stress reduction strategy.

## Concluding Remarks

Based on this study, staff members did seek out and utilize NOEs during COVID-related lockdowns with greater frequency than before the pandemic. While the motivations varied by individual, overall respondents were more likely to seek out such sites for stress relief or recreation, and less for social contact or group gatherings. Improving access to green spaces on campus by providing flexibility with break time, increased promotion of their availability, or reduction of physical barriers, can benefit the well-being of staff members.

This study emphasizes that in examining the ability of employees to spend time in natural outdoor environments, we must also consider their unique social and environmental contexts. Factors including the type of community they live in, the people they live with, their work location, their motivations and their race can all impact the particular facilitators or barriers to experiencing natural outdoor environments.

While some university staff continue to work fully or partially from home, many are returning to campus-based

work. Universities and other large-scale employers are therefore faced with a prime opportunity to not only improve the overall well-being of the staff, but to reduce disparities in well-being and access to nature among their employees. By working to both increase the availability of safe and supportive natural outdoor environments available on site, as well as identifying and working to overcome physical, social and environmental barriers to spending time outdoors faced by employees, universities and other employers could help to foster healthy, productive and more resilient workers and work environments during and beyond 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 the Cornell University Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

All authors contributed to original draft preparation, conceptualization and development of the study protocol and survey tool, data review and interpretation, and reviewing and editing.

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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.2022.869122/full#supplementary-material>



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# Predicting Parental Mental Health During COVID-19: Economic Pressure, COVID-19 Stress, and Coping Strategies

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As the COVID-19 pandemic continues, understanding connections between economic pressures and mental health experiences is critical in comprehending how stressful global events can affect families. Although economic pressures and stress can negatively impact mental health, approach coping strategies may provide reductions in negative mental health experiences for parents compared to avoidant coping strategies. Despite recent work showing that stress resulting from the pandemic can have negative implications for the mental health of parents with young children, there is little known about the mental health of parents with adolescents. This study utilized a longitudinal sample of 198 parents (194 biological parents; 103 Fathers, and 91 Mothers) of adolescents and examined the mediating impact of COVID-19 stress on the relationship between economic pressure and subsequent depressive and anxious symptoms. Additionally, approach and avoidant coping strategies were examined as potential moderators between COVID-19 stress and later mental health. Results indicated that parents who experienced economic pressure reported worsening mental health across the school semester, with COVID-19 stress mediating this pathway. Further, approach coping strategies moderated the association between COVID-19 stress and later anxiety symptoms such that higher levels of coping associated with greater rates of later anxiety symptoms, while lower levels of coping associated with less anxiety symptoms later. Avoidant coping strategies also moderated these associations, such that greater use associated with greater depressive and anxious symptomatology later. These findings emphasize that parents are experiencing worsening mental health following the onset of the pandemic and that there is an urgent need for increased mental health services to assist families during this time.

**Keywords:** parents, COVID-19, coping, anxiety, depression

## INTRODUCTION

The coronavirus (COVID-19) was declared a pandemic in early 2020 by the World Health Organization (Centers for Disease Control and Prevention, 2021). In addition to its ongoing health impacts, COVID-19 continues causing global restrictions on travel (National Center for Immunization and Respiratory Diseases, 2021), requiring country-wide lock-downs and restrictions

to control the spread of the virus (Viner et al., 2020). COVID-19 has also presented numerous novel social challenges for families. Social isolation has increased because of the risk of infection. Concurrently, there has been fluctuations in socio-educational environments for families. Accordingly, mental health in families has been affected (Calvano et al., 2021; Westrupp et al., 2021). Parents of school aged children reported increased stress and depression during pandemic-related school closures in 2020, resulting in online education in the hopes of preventing the spread of COVID-19 among youth (Bäuerle et al., 2020; Jeffs et al., 2020; Lee, 2020; Viner et al., 2020). However, switching from in-person to online education left parents with the burden of managing their children's education while also working from home. As the pandemic continues its disruptive course, understanding connections between these economic pressures and mental health experiences is critical in understanding how stressful global events can affect families. The family stress model (FSM; Conger et al., 2002, 2010) offers a framework to contextualize links between economic strains and worsening mental health in the context of COVID-19, particularly as there is little research linking these pathways in parents (Kämpfen et al., 2020), and less even on families (Prime et al., 2020; Wahlund et al., 2020).

## COVID-19 and Mental Health

Examining the effects of COVID-19 on family function is paramount to understanding mental health within the family context. Given that environmental and personal stressors influence mental health (e.g., Hogan, 2003; Conger et al., 2010), the pandemic presents a singular stressor that has influenced life broadly. Early studies of the pandemic's impact paint a dim view of family adaptability to COVID-19, as parents and children report increased stress and depressive experiences (Ho et al., 2020; Jeffs et al., 2020; Usher et al., 2020). Likewise, negative effects of COVID-19 are similarly documented for parental adaptability to stress (Jeffs et al., 2020; Viner et al., 2020; Kar et al., 2021) and parental emotional wellbeing (Wilson et al., 2020; Lee et al., 2021). The ability to manage worry during the pandemic has dwindled worldwide as parents report greater levels of anxiety (Ho et al., 2020; Lee et al., 2021).

In recent studies, the percentage of parents who experience moderate to high anxiety during the pandemic are exceptionally high, up to 20% or more (Barzilay et al., 2020; Wahlund et al., 2020; Wilson et al., 2020; Kar et al., 2021), compared to the normative adult average of approximately 5.6% (Brown et al., 2001; SAMHSA, 2020, 2021). Parents and caregivers of school aged children experienced increased anxiety during the initial months of COVID-19 (Barzilay et al., 2020; Wu et al., 2020), along with increased worry regarding COVID-19 (Bäuerle et al., 2020; Steele, 2020). As with anxiety, rates of depression (e.g., feeling sad, lethargic, apathetic, demoralized, or hopeless) during COVID-19 have increased dramatically. Indeed, research has found that up to an alarming 40% of parents (compared to the normative adult baseline of 9%) report significant depressive symptoms culminating in clinically impactful levels of impairment (SAMHSA, 2020, 2021; Lee et al., 2021). Parents of young

children during COVID-19 experience even higher depressive symptoms (Wu et al., 2020; Lee et al., 2021) than those with older children, such as adolescents. Even so, parents of adolescents continue to navigate depression on a daily basis (National Research Council and Institute of Medicine, 2009).

As children transition into the period of adolescence and develop more independence, parents are less knowledgeable about their child's behaviors and whereabouts, which can result in increased stress for parents (Small et al., 1988). Adolescents navigate greater autonomy, less supervision and less direct care compared to young children (Noom et al., 2001). Parents also report less understanding of their adolescent's thinking, which often associates with communication disparities and conflict in parent-adolescent relationships (Sillars et al., 2005). Given that parents of adolescents often navigate increased stressors related to their adolescent's typical development, increased stress from the pandemic may compound these normative stressors and worsen their overall mental health. Yet, few studies have examined the mental health of parents of adolescents, despite their role in navigating more complex interactions with their increasingly autonomous children (Viner et al., 2020; Wu et al., 2020). In short, understanding family functioning during the COVID-19 pandemic requires consideration of the ubiquitously emotional and mental health states.

As the COVID-19 pandemic has progressed, resources that were available prior to the pandemic's onset have become more sparse. Indeed, psychological services, accounting for the emergency telehealth allocation for regional providers, have become less available as the needs of new and current clients have increased (Turabian, 2020; McLean and McIntosh, 2021). Furthermore, practitioners addressed client needs alongside their own, often at personal sacrifice (McLean and McIntosh, 2021). With the limited understanding of the COVID-19 virus, many practitioners were unprepared for shifts in service modality (i.e., in-person to virtual), and the mental health ramifications of lockdowns enforced by local governments.

## Parenting Stressors: Economic Pressure and COVID-19

Millions of families across the globe have been affected by economic difficulties due to pandemic restrictions on travel, reduced employment opportunities, and lost jobs. Unsurprisingly, the early stages of the pandemic witnessed the greatest peak in unemployment, prompting many countries to enact higher unemployment benefits and stimulus payments to their citizens (Kämpfen et al., 2020; Wilson et al., 2020). Economic pressure resulting from the pandemic has affected the ability of families to purchase the resources they need to survive, such as food, utilities, and housing. This impact on resource availability, in turn, initiates a cascade of economic problems (e.g., Fallon et al., 2020), which often leaves the mental health of family members neglected in the process (Conger et al., 2002, 2010). Mental health problems caused or exacerbated by the pandemic must be addressed (Barzilay et al., 2020; Bäuerle et al., 2020; Wu et al., 2020) as the mental health of family members may be a looming crisis due to the impact of isolation and excessive



worry caused by the pandemic (Galea et al., 2020; Kathirvel, 2020). Thus, examining mental health alongside economic pressure is a logical step in contributing to a contextualized understanding of mental health in families, and how to best address these issues in mental health practice.

The FSM proposes that economic pressure has broad and potentially negative effects on parent mental health (Conger et al., 2002, 2010). Increased economic pressure exacerbates problematic psychological functioning and worsens parental anxiety and depression (Masarik and Conger, 2017). Thus, families are at higher risk of developing worsening mental health when they experience economic pressure (Prime et al., 2020), with low income families experiencing more mental health problems than those with greater income (Evans et al., 2020). However, the contextual factors that may explain the transmission of stress from economic pressure to mental health functioning is less understood.

Given the salience of negative life events on economic pressure and parent mental health (Masarik and Conger, 2017), it is critical to identify timely societal stressors that may explain this association. As economic burdens, such as job loss, can have detrimental impacts on adult mental health in a relatively short period (Burgard et al., 2007), it is essential to have timely reports of mental health functioning close to that of economic and stressful events. With the announcement of the pandemic, parents reported increased stress during the initial months of COVID-19 and the subsequent academic school year (Sonnenschein et al., 2021). The combination of economic stress and parenting stress during COVID-19 can influence the mental health of families in relatively short time spans, as suggested in prior research (Evans et al., 2020; Dvorsky et al., 2021). As families attempt to address the increased stressors affecting their daily lives, it becomes essential to gather proximal timely reporting of family functioning to understand changes in family mental health. The FSM emphasizes the importance of event conceptualization of stressful life events. The way in which an individual perceives chronic stressors can affect their mental health (Lu, 1994). Additionally, the FSM proposes that protective factors (i.e., coping strategies) can moderate the association between perceptions of stressful life events and their later mental health. Examining the interaction of event conceptualization (e.g., COVID-19 stress) and protective factors (e.g., coping strategies) then may predict later mental health, as one's mental health is influenced by their environment and interactions with it.

## Coping Strategies

The FSM proposes individual protective factors, such as coping strategies, can provide an avenue to reduce the effects of economic hardship on mental health. Coping strategies are known to reduce stressful and depressive experiences (Kim et al., 2008; Kadiravan and Kumar, 2012), and can be conceptualized as either approach (i.e., strategies for adapting thoughts or actions to a given situation) or avoidant (i.e., behaviors consistent with ignoring or dissociating from given situations; Folkman and Lazarus, 1988). Approach coping strategies are more effective in dealing with stressful events than avoidant coping (Babore et al., 2020), as approach coping

changes the way individuals interact with their environment, while avoidant coping provides distractions and redirects to avoid confronting and addressing stressful events. Approach coping adapts an individual's behavior and encourages healthy management of feelings and emotions (Folkman and Lazarus, 1988). Unfortunately, effective use of approach coping during periods of high stress often requires instruction, such as resources that are provided in clinical settings (Ergüner-Tekinalp and Akkök, 2004; Babore et al., 2020). However, avoidant coping, which reinforces a disregard for current stressful experiences, are readily available and easily learned, such as with various substance use (Tate et al., 2006). During times of crisis, such as the pandemic, approach coping strategies have been utilized at a lower rate than avoidant coping among adults, including parents (Verger et al., 2020; Kar et al., 2021). Reductions in anxious and depressive symptoms, along with increases in self-worth and esteem, have been found when parents employ approach coping skills compared to avoidant (Kadiravan and Kumar, 2012; Babore et al., 2020). To date, the interplay between coping strategies and stress from COVID-19 has not been examined in parental populations. Additionally, studies on parents of adolescents are particularly needed given the substantial and unique stress experienced within these households.

## CURRENT STUDY

This study used a longitudinal sample of parents and caregivers of adolescent middle school aged children to examine mental health during the first in-person school semester following the COVID-19 pandemic. Expanding on the FSM framework, this work aimed to elucidate the mechanisms of COVID-19 stress between economic pressure and mental health, and coping strategies as a potential buffer between COVID-19 stress and mental health (Masarik and Conger, 2017). We hypothesized that (a) higher economic pressure would positively predict later depression and anxiety symptoms, (b) COVID-19 stress would mediate the association between economic pressure and later depression and anxiety, such that higher COVID-19 stress would positively predict later depression and anxiety, (c) approach coping strategies would moderate the association between COVID-19 stress and later mental health symptoms (e.g., anxiety and depression), such that greater use of approach coping strategies would diminish the positive association between COVID-19 stress and later mental health, and (d) avoidant coping strategies would moderate the association between COVID-19 stress and later mental health symptoms, such that greater use of avoidant coping strategies would exacerbate the positive association between COVID-19 stress and later mental health.

## MATERIALS AND METHODS

### Participants

This study used longitudinal data from the Resilient Families Study, gathered from parents and caregivers of 7 or 8th grade



adolescents residing in Texas. To maximize inclusion of various family types, parents, and caregivers (herein referred to as parents), included biological, step, and adoptive parents, as well as aunts and uncles as these individuals may provide significant caregiving for adolescents. All participants reported providing primary care for the adolescent in a parental role. Of the 212 participants who completed the first online survey, 14 were removed based on data quality recommendations (e.g., slow response time, inconsistent demographics; Teitcher et al., 2015). Specifically, we removed individuals from analyses if they had identical IP addresses, unusually fast survey completion rate (i.e., completion time under 10 min), or inconsistent responses. The final sample of 198 participants ( $M_{\text{age}} = 42.0$  years old, range = 30–56 years old; 94 females) identified primarily as White (92.1%) and reported being a biological parent ( $n = 194$ ; 103 Fathers, 91 Mothers), stepmother ( $n = 1$ ), aunt ( $n = 1$ ), uncle ( $n = 1$ ), or adoptive mother ( $n = 1$ ) of an adolescent child. Parents reported on 198 adolescents between 7 and 8th grade for this study ( $M_{\text{age}} = 14.22$  years old, range = 9–16 years old; 68 female). As shown in **Table 1**, most parents earned an annual household income between \$45,000 and \$74,999 (64.7%), completed at least some college (95.4%), and were married (93.9%).

## Research Design

Eligible families were recruited through social media (i.e., Facebook) posts in local parenting groups. Participants completed a brief online questionnaire that screened for the study criteria of being a local parent/caregiver of a 7 or 8th grade adolescent

who was willing to participate in two online surveys. Consent was obtained from participants through Qualtrics, in accordance with the Institutional Review Board. Eligible participants were emailed information about the study and provided a personal Qualtrics link to the first of two online surveys, which was completed at the beginning of the 2020 fall school semester ( $N = 198$ ). The second survey was administered approximately 2 months later, near the end of the 2020 fall semester ( $N = 187$ ; 94% retention). As parents were facing multiple stressors from the pandemic and concerns over management of the academic school year, an opportunity became apparent to understand influences on parental mental health experiences during this salient period of back to in-person schooling. As such, our surveys were administered over the fall 2020 academic semester to capture parental mental health experiences during this crucial period. At the beginning and end of each survey mental health resources were provided to participants given that some questionnaires pertained to psychological functioning. Participants were compensated with an Amazon.com gift card after completion of each survey; \$10 for the first survey, \$15 for the second.

## Measures

The following questionnaires were reported by parents at Time 1 (T1) and Time 2 (T2). Parents completed identical survey items at T1 and T2 for all measures reported. The time at which measures were used for the mediation models are noted in each section.

### T1 Economic Pressure

Parents reported on their experiences of economic pressure and ability to meet economic needs over the past 3 months using the Economic Pressure Scale (Conger et al., 2002). Parents responded to nine items, the first asked about difficulty meeting economic needs with responses ranging from 0 (*no difficulty at all*) to 3 (*a great deal of difficulty*). The second asked about the family's financial position at the end of each month, in which responses ranged from 0 (*with more than enough money left over*) to 3 (*very short of money*). Lastly, seven reverse scored items asked if parents had enough money to meet their needs in different areas (e.g., *to afford the kind of home they needed* or *to afford the utilities they needed*). Responses ranged from 0 (*not at all true*) to 3 (*very true*). Responses were summed with higher scores indicating greater economic pressure and the scale demonstrated great reliability ( $\alpha = 0.87$ ).

### T1 COVID-19 Stress

Parents reported their experiences of stress related to COVID-19 using the COVID-19 Stress Scale (Ladouceur, 2020). This scale examines the effects of COVID-19 on adolescents and through parental report, and research has supported their effectiveness in doing so (Dvorsky et al., 2021; Styck et al., 2021). Parents rated their stress about COVID-19 on four items asking, "How worried have you been about..." including, "Your physical health being influenced

**TABLE 1 |** Demographics: ethnicity, family total income, parental education, and marital status.

Variables	N (%)
Parental ethnicity	
Caucasian/White	182 (91.91%)
Hispanic/Latino	6 (3.03%)
Caribbean	6 (3.03%)
Multiethnic	4 (2.02%)
Family total income ( $N = 197$ )	
<\$45,000	19 (9.6%)
\$45,000–\$74,999	128 (64.7%)
\$75,000–\$99,999	39 (19.7%)
\$100,000–\$150,000	6 (3.0%)
> \$150,000	5 (2.5%)
Parental education ( $N = 198$ )	
Some high school	1 (0.5%)
High school diploma	8 (4.0%)
Some college	47 (23.7%)
Associate's degree	49 (24.7%)
Bachelor's degree	62 (31.3%)
Some graduate school	19 (9.6%)
Master's degree (e.g., M.A. and M.S.)	11 (5.6%)
Professional degree (e.g., M.D. and Ph.D.)	1 (0.5%)
Marital status ( $N = 198$ )	
Single (never married)	5 (2.5%)
Married (first, second, and third)	186 (93.9%)
Divorced	5 (2.5%)
Separated	1 (0.5%)

by COVID-19,” and, “Friends or family being infected,” with scores ranging from 0 (*not at all*) to 5 (*extremely*). Responses were summed with higher overall scores indicating greater stress related to COVID-19 and the scale yielded excellent reliability ( $\alpha = 0.90$ ).

## T1 Coping Strategies

Parents completed the Brief COPE (Carver, 1997), which has been used to examine adaptive (approach) and maladaptive (avoidant) types of coping strategies. The Brief COPE is comprised of 28 items that make up 14 subscales (two items each). Seven subscales represent approach coping strategies and seven represent maladaptive coping strategies (for review, see Carver, 1997). For this study, we examined approach coping strategies given their association with adult well-being (Carver, 1997; Verger et al., 2020) and our aim to identify a potential buffer against the effect of COVID-19 stress and poor parent mental health. We additionally examined avoidant coping strategies to further compare potential moderating effects between approach and avoidant coping.

We used six approach coping subscales (active coping, instrumental support, planning, acceptance, emotional support, and positive reframing) that included two items each. Religious coping was excluded as prior studies have indicated that this type of coping can associate more with maladaptive strategies, rather than with approach strategies (Krägeloh, 2011). Example items included, “I’ve been trying to come up with a strategy about what to do,” and “I’ve been looking for something good in what is happening,” and ranged from 0 (*I have not been doing this at all*) to 3 (*I’ve been doing this a lot*). To create the approach coping strategies scale, six approach subscales were averaged and yielded satisfactory reliability ( $\alpha = 0.81$ ), with higher scores indicating greater use of approach coping strategies.

To measure avoidant coping, we used six of the maladaptive coping subscales (behavioral disengagement, denial, self-distraction, self-blame, substance use, and venting) comprised of two items each. Humor coping was excluded due to its adaptability for both approach and avoidant coping styles (Dozois et al., 2009). Items such as “I’ve been refusing to believe that it has happened,” ranged from 0 (*I have not been doing this at all*) to 3 (*I’ve been doing this a lot*). Subscales were averaged to create the avoidant coping strategies scale, which yielded satisfactory reliability ( $\alpha = 0.86$ ), with greater scores indicating greater utilization of avoidant coping.

## T2 Depression

Parents reported on their depressive symptoms using the Patient Health Questionnaire 9-Item (PHQ9; Kroenke et al., 2001), which is a widely used depression screening measure that is often incorporated into patient-based care and clinical treatment evaluation. Items evaluate depressive symptom experiences over the past 2 weeks and align with the diagnostic criteria of a depressive episode (American Psychiatric Association, 2013) with individual response scores ranging from 0 (*not at all*) to 3 (*daily*). Response items were summed with higher overall

scores indicating higher depressive experiences and the scale revealed high internal consistency ( $\alpha = 0.85$ ).

## T2 Anxiety

Parents reported on their anxiety symptoms using the Generalized Anxiety Disorder 7-Item (GAD7; Spitzer et al., 2006b), which is a widely used measure of anxiety symptoms and internalized mental health distress. Items are consistent with the diagnostic criteria for generalized anxiety (American Psychiatric Association, 2013), with responses ranging from 0 (*not at all*) to 3 (*daily*). Items are summed to produce a total score, with higher scores indicating greater anxiety symptoms. The GAD7 scale had high internal consistency ( $\alpha = 0.84$ ).

## T1 Covariates

Participants reported on their gender, household income last year (2019), highest level of education, and personal distress, which were included as covariates given their association with the variables of interest. The personal distress subscale from the Brief Interpersonal Reactivity Index (Davis, 1983) was used to assess parental feelings of personal anxiety and unease in tense interpersonal settings. We controlled for personal distress in the model as it gauges individual-level of stress in given situations, and it allowed for a more robust integration of COVID-19 stress outside of normal levels of distress individuals feel in everyday life. The personal distress subscale is made up of seven items scored from 0 (*does not describe me well*) to 4 (*describes me well*). Response items were summed with higher scores indicating greater personal distress; internal consistency was acceptable ( $\alpha = 0.70$ ).

## Analysis Plan

Analyses were conducted in SPSS version 27 (IBM Corp. 2020) using the PROCESS macro (Hayes, 2013). The PROCESS macro provides models to test mediation and moderated mediation, both of which were utilized with outcome variables depression and anxiety. The mediation models examined COVID-19 stress as a mediator between economic pressure and the outcomes depression and anxiety. The second set of models examined moderated mediation of the previous models with approach and avoidant coping strategies as a moderator between COVID-19 stress and the outcome variables of depression and anxiety. Covariates for all models included last year’s household income, and parental education, gender, and initial levels of personal distress. The data that support the findings of this study are available upon request from the corresponding author.

## RESULTS

### Descriptive Statistics

Bivariate correlations, means, and SDs of study variables are presented in **Table 2**. Economic pressure at T1 was significantly and positively correlated with T1 COVID-19 stress ( $r = 0.32$ ), T1 approach coping ( $r = 0.16$ ), T2 anxiety symptoms ( $r = 0.25$ ),

**TABLE 2 |** Bivariate correlations and descriptive statistics of covariates and variables of interest.

Measure	1	2	3	4	5	6	7
1. T1 Economic Pressure	—	0.04	0.32**	0.16*	0.13	0.25**	0.29**
2. T1 Personal Distress		—	0.05	0.02	0.56**	0.39**	0.44**
3. T1 COVID-19 Stress			—	0.58**	0.33**	0.23**	0.21**
4. T1 Approach Coping				—	0.45**	0.18*	0.24**
5. T1 Avoidant Coping					—	0.48**	0.52**
6. T2 Anxiety (GAD7)						—	0.89**
7. T2 Depression (PHQ9)							—
<i>M</i>	25.29	12.56	4.59	5.63	4.83	8.99	10.15
<i>SD</i>	5.97	2.89	1.17	1.03	1.20	4.89	9.02

*M*, Mean; *SD*, standard deviation; T1, Time 1; and T2, Time 2. \* $p < 0.05$ ; \*\* $p < 0.01$ . All correlations tested at this level. Two-tailed significance.

and T2 depressive symptoms ( $r = 0.29$ ), such that higher economic pressure associated with higher levels of all other variables. Personal distress was significantly and positively correlated with T1 avoidant coping ( $r = 0.56$ ), T2 anxiety symptoms ( $r = 0.39$ ), and T2 depressive symptoms ( $r = 0.44$ ), but not with T1 COVID-19 stress ( $r = 0.05$ ) or T1 approach coping ( $r = 0.02$ ). Approach coping at T1 was significantly and positively associated with T1 avoidant coping ( $r = 0.45$ ), T2 anxiety symptoms ( $r = 0.18$ ), and T2 depressive symptoms ( $r = 0.24$ ). Avoidant coping at T1 was additionally significantly and positively associated with T2 anxiety symptoms ( $r = 0.48$ ), and T2 depressive symptoms ( $r = 0.52$ ). Finally, depression and anxiety symptoms at T2 were significantly and positively correlated with one another ( $r = 0.89$ ).

Parental depression symptoms at T1 ( $M = 10.01$ ,  $SD = 5.10$ ) and T2 ( $M = 10.15$ ,  $SD = 6.02$ ) were not significantly different [ $t(185) = -0.248$ ,  $p = 0.804$ ], indicating that parental depression symptoms did not significantly change between T1 and T2 ( $d = 0.03$ ). As expected, depressive symptoms at T1 and T2 were significantly correlated with each other [ $r(185) = 0.492$ ,  $p < 0.001$ ]. Parental depressive symptoms were estimated to clinical ratings of depression at or above a score of 10 (Kroenke et al., 2001). At T1, 106 (53.8%) parents reported depressive symptoms at or above clinical cutoffs, compared to T2, 92 (49.7%) parents reported depressive symptoms at or above clinical cutoffs. Additionally, 71 (66.9%) parents maintained clinical levels of depressive symptomology from T1 to T2, with 35 parents reporting lessening symptoms, and 21 parents reporting increases in depressive symptomology.

Parental anxiety symptoms reported at T1 ( $M = 8.99$ ,  $SD = 4.89$ ) and T2 ( $M = 8.08$ ,  $SD = 4.68$ ), [ $t(185) = 2.76$ ,  $p = 0.006$ ] differed statistically, but not at a clinically meaningful level ( $d = 0.19$ ). Parental anxiety scores at T1 were significantly correlated with scores at T2 [ $r(185) = 0.575$ ,  $p < 0.001$ ]. Clinical cutoffs for parental anxiety symptoms were determined using recommendations from Spitzer et al. (2006b), where scores of 10 or more were indicative of clinically significant levels of anxiety symptoms likely to impair function. At T1, 86 (43.6%) parents reported anxiety symptoms at or above clinical cutoffs, compared to T2, where 77 (41.6%) parents reported anxiety symptoms at or above clinical cutoffs. Additionally, 63 (34%) parents maintained clinical levels of anxiety symptoms from T1 to T2, with 23 parents reporting lessening symptoms, and 14 parents reporting increases in anxiety symptomology.

## Regression Results

### Depression

A mediation model was tested with COVID-19 stress as a mediator between economic pressure and later depressive symptoms (Figure 1). Economic pressure was significant in predicting later depressive symptoms ( $b = 0.20$ ,  $p = 0.013$ ) and COVID-19 stress ( $b = 0.08$ ,  $p < 0.001$ ), such that greater economic pressure associated with increased depressive symptoms and COVID-19 stress. Likewise, COVID-19 stress significantly predicted later depressive symptoms ( $b = 0.90$ ,  $p = 0.012$ ), such that greater COVID-19 stress was strongly associated with increased depressive symptoms. Indirect effects in the model ( $b = 0.07$ ,  $SE = 0.037$ , 95% CI [0.012, 0.156]) indicate that COVID-19 stress was a significant mediator of prior economic pressure on later depressive symptoms. Thus, COVID-19 stress contributes to economic pressure's influence on parental depressive symptomology such that families experiencing higher economic pressure are likely to experience significantly greater COVID-19 related stress, which in turn increases their likelihood of experiencing substantial depressive symptomology later on.

Next, approach coping strategies was included as a moderator between COVID-19 stress and later depression symptoms in the previous model. Contrary to our predictions, approach coping strategies did not significantly moderate the association between COVID-19 worry and later depressive symptoms ( $p = 0.515$ ).

Lastly, avoidant coping strategies were included as a moderator as in the previous analysis. The interaction effect of COVID-19 stress and parental avoidant coping strategies significantly predicted later depressive symptoms ( $b = 0.60$ ,  $p = 0.009$ ), and the indirect effect of the moderated mediation was significant ( $b = 0.08$ ,  $SE = 0.042$ , 95% CI [0.005, 0.177]). Simple slopes were not significant for high ( $p = 0.672$ ) or low ( $p = 0.735$ ) reported use of avoidant coping. Results indicate that the interaction is significant, such that parents who use high avoidant strategies significantly differ in their association between COVID-19 stress and depressive symptomology compared to those with low strategies. Parents who utilized greater avoidant coping showed a greater association between COVID-19 stress and worsened depressive symptoms, while parents that utilized less avoidant coping showed a lower association between COVID-19 stress and later depressive symptoms. Results suggest that the interaction

between COVID-19 stress, and avoidant coping exacerbates later depressive symptoms in parents.

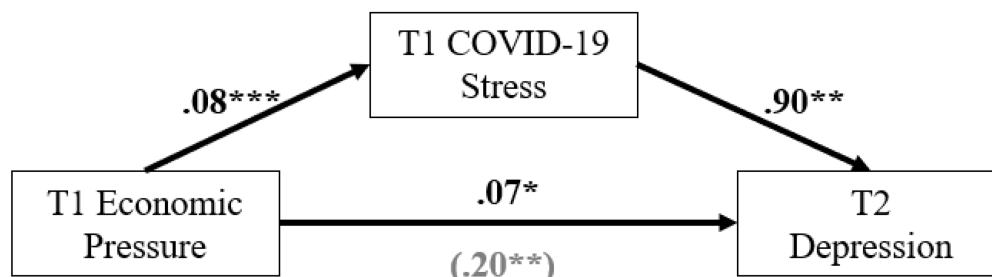
### Anxiety

A separate mediation model was tested with COVID-19 stress as a mediator between economic pressure and later anxiety symptoms (**Figure 2**). Economic pressure was significant in predicting later anxiety symptoms ( $b=0.18$ ,  $p=0.005$ ), and COVID-19 stress ( $b=0.08$ ,  $p<0.001$ ), such that greater economic pressure associated with greater anxiety symptoms and COVID-19 stress. COVID-19 stress also predicted increases in later anxiety symptoms ( $b=0.72$ ,  $p=0.005$ ). While economic pressure and COVID-19 stress were significant in predicting later anxiety symptoms; the indirect effect of the model suggests that COVID-19 stress was not a significant mediator ( $b=0.06$ ,  $SE=0.034$ , 95% CI  $[-0.003, 0.136]$ ). Thus, unlike the trends identified for depressive symptoms, the positive association between economic pressure and later anxiety symptoms was not significantly mediated by COVID-19 stress.

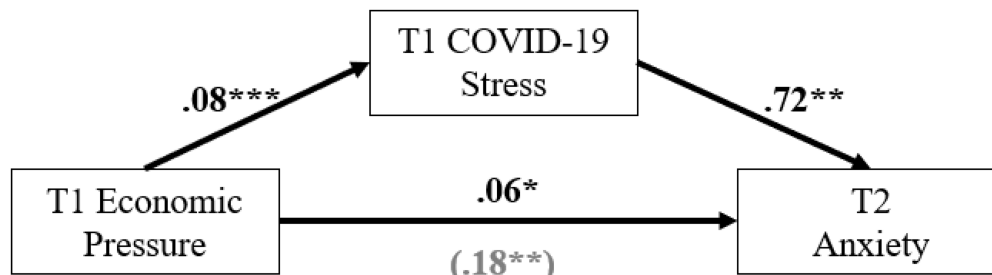
Approach coping strategies were then tested as a moderator between COVID-19 stress and later anxiety symptoms (**Figure 3**). Following recommendations from Holland et al. (2017), moderated mediation can be tested even when mediation is not significant alone, as a moderator may complete the model. The moderated mediation effect of COVID-19 stress and parental use of approach coping strategies significantly predicted later anxiety symptoms ( $b=0.14$ ,  $p=0.016$ ), and the indirect effect of the moderated mediation was significant ( $b=0.07$ ,  $SE=0.034$ , 95% CI  $[0.009, 0.143]$ ), thus completing the previous model.

As shown in **Figure 3**, we plotted slopes for parents who reported low vs. high approach coping strategy utilization for the association between COVID-19 stress and later anxiety symptoms. The bar line in **Figure 3** indicates moderate clinical cutoffs for anxiety symptoms based on the GAD-7 (summative score of 10; Spitzer et al., 2006a) to show that most parents reported moderate to high levels of anxiety symptoms. Simple slope analyses showed that there was a positive association between COVID-19 stress and later anxiety symptoms for parents who reported low ( $t=2.25$ ,  $p=0.025$ ) and high ( $t=3.06$ ,  $p=0.003$ ) use of approach coping strategies, though high use had a greater positive association between COVID-19 stress and later anxiety symptoms. These results suggest that the level of approach coping strategies utilized by parents modulates the association between their COVID-19 stress and later anxiety symptoms.

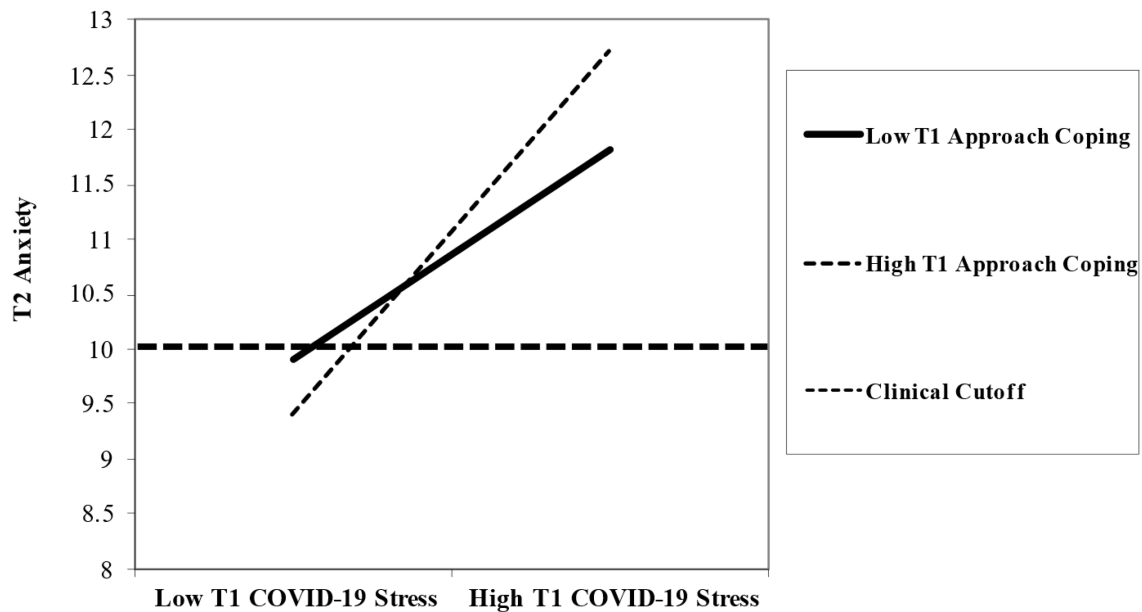
Finally, avoidant coping strategies was included as a moderator as in the previous set of analyses (**Figure 4**). The interaction for COVID-19 stress and parental avoidant coping strategies significantly predicted later anxiety symptoms ( $b=0.83$ ,  $p<0.001$ ), and the indirect effect of the moderated mediation was significant ( $b=0.11$ ,  $SE=0.038$ , 95% CI  $[0.042, 0.193]$ ). Simple slope analyses indicated a positive association between COVID-19 stress and later anxiety symptoms for parents reporting low ( $t=3.02$ ,  $p=0.003$ ) and high ( $t=3.83$ ,  $p<0.001$ ) use of avoidant coping strategies. COVID-19 stress and use of avoidant coping strategies were positively associated with greater later anxiety symptoms for parents. However, high avoidant coping had a stronger positive association with COVID-19 stress than did low use,



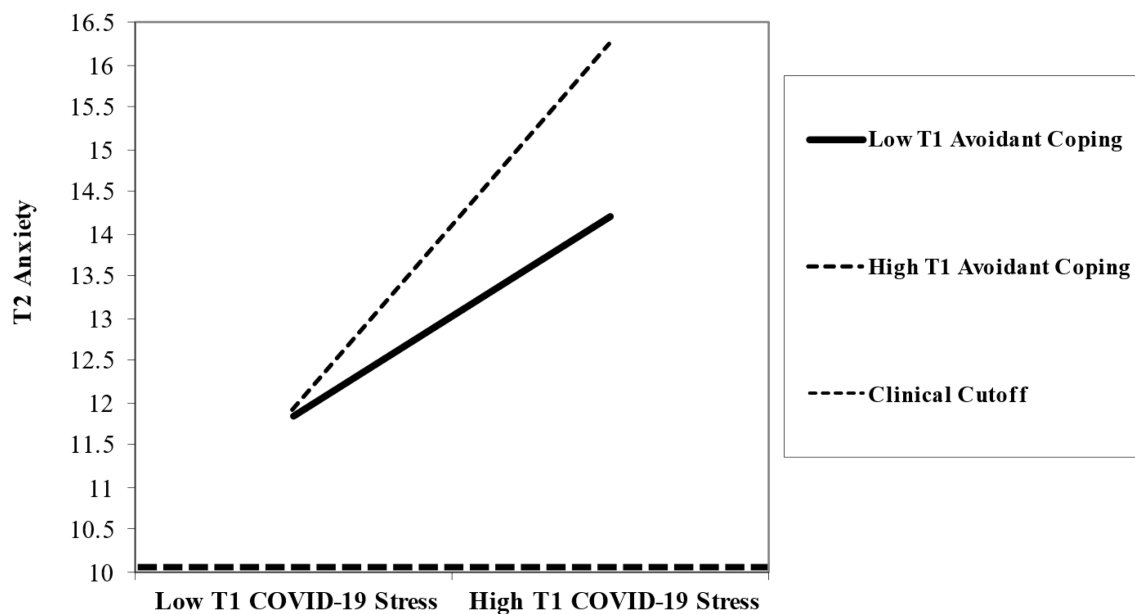
**FIGURE 1** | COVID-19 stress as a mediator between economic pressure and later depression. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .



**FIGURE 2** | COVID-19 stress as a mediator between economic pressure and later anxiety. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .



**FIGURE 3 |** Interaction between COVID-19 stress and approach coping predicting later anxiety.



**FIGURE 4 |** Interaction between COVID-19 stress and avoidant coping predicting later anxiety.

such that when COVID-19 stress was greater parents with high avoidant coping reported greater later anxiety symptoms. Though parents with low use of avoidant coping and COVID-19 stress still reported clinically significant levels of anxiety symptoms. Results suggest interactions between COVID-19 stress and avoidant coping utilization exacerbate differences in later anxiety symptomatology.

## DISCUSSION

In this study, we evaluated the longitudinal impact of economic pressure and COVID-19 stress on internalizing mental health of parents with adolescent children, for whom little extant literature exists. Our results present three distinct findings which warrant attention and carry with them implications



for family research and the FSM more broadly. Specifically, we found that event associated stress (e.g., pandemic related worry) mediated experiences of economic pressure and later depressive and anxious symptoms. Approach coping strategies were insufficient in managing anxiety symptomology during the pandemic, with greater use associated with higher reported anxiety symptoms later in the context of high COVID-19 stress. Finally, avoidant coping strategies also predicted later depression and anxiety symptoms, such that greater use of avoidant coping associated with greater reported mental health symptoms in the context of high COVID-19 stress, for both anxiety and depression. This study affirms that parents of adolescent's face many of the same economic pressures and negative mental health effects as parents of younger children as they navigate the difficulties presented by the ongoing COVID-19 pandemic.

## Depressive Symptomology

According to the FSM, economic pressure influences family mental health (Masarik and Conger, 2017). In our model, COVID-19 stress functioned as a significant mediator of economic pressure and the development of depressive symptoms in parents of adolescents. Thus, the more parents worry about the safety and wellbeing of their family from the ongoing COVID-19 pandemic, the worse the depressive symptoms become. Our novel inclusion of COVID-19 stressors within the FSM adds contextual indicators of societal wellbeing that may not be fully captured in previous literature (e.g., Kämpfen et al., 2020; Prime et al., 2020). Thus, the prediction of parental depressive symptoms (as a specific aspect of mental health) can be improved by gathering context-specific lived experience about major events (e.g., pandemic specific worry).

In the context of daily functioning, depressive symptoms can wreak havoc on sleep, adaptability, and resilience (Hammen, 2005). In clinical settings, using approach coping strategies can reduce depressive symptoms by approximately 38%, although psychotherapy treatment has a greater effect (Cuijpers et al., 2009; Pozzi et al., 2015; SAMHSA, 2020). Despite our findings on the influence of COVID-19 worry on the development of depression symptoms, reported use of approach coping did not buffer this association. This non-significant effect of approach coping provides some important implications for the management of parental depression symptoms during pandemics. Although we assessed a wide array of common coping strategies (e.g., positive reframing and acceptance), it may be that the coping strategies measured have a low impact on managing pandemic related depressive symptoms because of the uniqueness and chronicity of the pandemic experience. Our finding may also reflect that reported use of coping strategies does not match their actual use, or the effectiveness of those strategies, when formally trained through psychotherapy (Cuijpers et al., 2009; Pozzi et al., 2015).

Avoidant coping strategies are consistent with worsening mental health in adult populations (Herman-Stabl et al., 1995). In this study, we found supporting evidence that avoidant coping strategies associated with worsening depressive symptoms

over time for adult parents of adolescents. Specifically, greater use of avoidant coping associated with heightened depressive symptoms, while low use associated with lower depressive symptoms across levels of perceived COVID-19 stress. Our findings suggest that parental use of avoidant coping strategies worsened mental health during the COVID-19 pandemic. Future studies should more closely examine the role of coping in the management of depressive symptoms.

## Anxiety Symptomology

Similar to parental depressive symptoms, we found economic pressure and COVID-19 stress positively predict later anxiety symptoms in parents of adolescents. Interestingly, COVID-19 stress alone did not significantly mediate the relationship between economic pressure and later anxiety symptoms, though individual pathways were still significant. Prior work has found that worry (often conflated with stress) is linked to anxiety symptoms through shared emotions and reactions (Raes, 2010). Stress responses and reports are even used in testing for anxiety, and are often seen as possible symptoms of increasing anxiety (Spitzer et al., 2006a). In our study, COVID-19 stress was included as a mechanism for economic pressure to act upon later anxiety symptoms as it relates to societal experiences of stress and worry during the current pandemic. Through use of the FSM, we examined how inclusion of pandemic stress could better associate experiences of economic pressure and parental experiences of later anxiety symptoms (Masarik and Conger, 2017). Our findings suggest that while inclusion of COVID-19 stress does illustrate connections present, COVID-19 stress does not offer a significant pathway for economic pressure to influence later anxiety symptoms alone. Indicating that for these parents, processes outside of the scope of the current study are likely contributing to variability in their reports of anxiety symptoms. We believe that the inclusion of societal stressors in the model can be beneficial in describing key pathways and influences of economic pressure which lead to instances of later anxiety symptoms.

To examine potential buffering effects on later anxiety symptoms, we examined approach coping strategies on the pathway between COVID-19 stress and later anxiety symptoms. Approach coping had significant effects on the interaction between COVID-19 stress and later anxiety symptoms, such that the level of approach coping utilization associated with similar levels of COVID-19 stress and later anxiety symptoms. Greater use of approach coping was linked with higher levels of COVID-19 stress and later anxiety symptoms, while lower use of approach coping was associated with lower COVID-19 stress and later anxiety symptoms. Contrary to our hypothesis, heightened use of approach coping strategies did not diminish the association between COVID-19 stress and later anxiety symptoms, nor did it reduce later anxiety symptomology. Our findings indicate that parental use of approach coping strategies is dependent on levels of experienced stress during the pandemic. As coping strategies are taught and encouraged when individuals experience heightened levels of stress, it follows that use should decline when those experiences of stress decrease (Folkman and Lazarus, 1988). This reasoning

aligns with prior findings on coping strategy use as those who are more likely to report greater use also report higher levels of experienced stress (Alosaimi et al., 2015; Roca et al., 2021). While reports of greater approach coping use are theorized to reduce later stress and anxiety, our findings indicate that there may be a conflictual link between approach coping strategies and later anxiety symptoms specifically that approach coping strategy use positively associates with later anxiety symptoms.

Continuing our examination of coping strategies, avoidant coping demonstrates an exacerbation of anxiety symptoms in the context of greater COVID-19 stress. As avoidant coping has been previously associated with worsening mental health (Herman-Stabl et al., 1995), our findings align with prior research to show a positive connection between greater use of avoidant coping and later anxiety symptoms. As parents have their own perceptions of how the pandemic is impacting them, their actions, such as avoidant coping, provide buffering effects for their later anxiety symptoms. Specifically, when parents report greater use of avoidant coping and high COVID-19 stress their later anxiety symptoms worsen, compared to low COVID-19 stress and high avoidant coping. However, lower use of avoidant coping may buffer the effect of high COVID-19 stress on later anxiety symptoms, such that low avoidant coping protects against exacerbating anxiety symptoms in parents. This suggests that perception of situational stress is indicative of later developed anxiety symptoms. Including contextual perceptions of events may then be critical for understanding parental mental health following stressful and unprecedented events.

In examining COVID-19 stress between economic pressure and later mental health in parents, our findings show that we can better understand mental health when accounting for both economic and societal stressors, such as the current pandemic. For both depressive and anxious symptoms, inclusion of coping strategies demonstrate the potential buffering and exacerbating effects when accounting for experienced stress. Future use of the FSM should include perception of societal stressors as they assist in predicting later mental health. Additionally, when examining parental mental health, careful consideration should be applied to the metrics used to gather this information. In our study, the GAD7 and PHQ9 were used to determine anxious and depressive symptom scores on a clinical level, though they are not sufficient alone in comprehending larger mental health clinical significance. Similarly, the use of coping strategies including adaptive and avoidant coping skills are by far not the only aspects of coping utilized in real world settings. Group members, such as family members, also influence and participate in stress management strategies (Kupst et al., 1995; Clark et al., 2014; Randall et al., 2016). Family coping, which includes the entire family as a unit, and dyadic coping, which includes two interacting members in a group, examine the ability of multiple members to work together to reduce and alleviate stress. Inclusion of more comprehensive measures of mental health and coping can help to identify mental health management and promote positive adaption in family populations. Future work should examine

the effectiveness of various coping strategies over time and later mental health.

## Limitations and Future Directions

Strengths of this study include the sensitive period during which this data were collected and the focus on parents of adolescents who are often overlooked in parenting research. However, several limitations should be noted and considered for future work. First, pandemic data collected over a relatively short period may not be generalizable to experiences during other times throughout the pandemic. Our data spanned the 2020 fall school semester and so does not include reports from the initial onset of COVID-19, inclusion of the vaccines that were rolled out in early 2021, nor the continued spread and new variants (Roy et al., 2021; Vasireddy et al., 2021). For the current study, we focused on the sensitive period of the first in-person school semester since the pandemic was declared, which included many uncertainties for parents of adolescents regarding their children's academic life and the spread of COVID-19. This study contextualized parents of adolescent's experiences of stress following the onset of COVID-19 as it relates to their mental health across the fall 2020 academic semester. Future work will benefit from inclusion of longitudinal data spanning from initial COVID-19 onset and beyond and will be of utmost importance to fully comprehend the effects of global systemic chronic stress on economic pressure and mental health. Second, while our sample was reflective of the geographic area in which it was collected, it represented a strongly homogenized group with relatively high average income and educational attainment. Thus, many of these families may have benefited from more stable employment and greater access to resources than many families. To understand the full range of effects COVID-19 has on family functioning, future research should prioritize examining more diverse families. Particularly, those with less access to support and at higher risk of experiencing prolonged economic pressure and stress resulting from COVID-19 (e.g., parents employed in service-based industries, with lower educational attainment, or who lack resources to balance work and childcare needs). Importantly, our study examined parents of adolescents, who are often overlooked in parenting research, though these parents report increased stress and conflict with their adolescent children when compared to those with young children. Third, although we examined mental health symptoms for anxiety (GAD7) and depression (PHQ9), individuals were not evaluated formally for meeting diagnostic criteria for any disorders. Future work should consider including diagnosis of mental illness as it relates to improving our understanding of economic pressures and later experiences of mental health. Finally, though we examined parental reports on mental health, the relationship parents shared with their adolescent were not examined. The shared relationship between parent and child has been known to influence mental health reports (Gittleman et al., 1998; Cooke et al., 2019), and is expected to influence family mental health during the time of COVID-19. Future work should consider how shared relationship quality may impact reports of mental health during the pandemic, and in further exploration of the FSM.

To conclude, this study examined the mental health of parents of adolescents through the FSM and included COVID-19 stress as a mediator of economic pressure and later mental health. COVID-19 stress acts as a mechanism by which economic pressure can negatively impact later anxiety and depression symptomatology. Approach coping was also examined as a buffer between COVID-19 stress and later anxiety experiences. Our findings indicate that the level of COVID-19 stress experienced relates to the level of coping skills used and later reported anxiety symptoms. The mental health of parents of adolescents requires greater attention given the lack of mental health resources available to parents during the pandemic (Jeffs et al., 2020; Usher et al., 2020). While parents are experiencing higher than average levels of anxiety and depression (Barzilay et al., 2020; Lee, 2020; Lee et al., 2021), utilization of approach coping skills was not found to reduce the clinical cutoff levels in our sample. These findings highlight that parents report utilizing approach coping strategies, but that current coping use may not be enough to offset negative mental health repercussions caused by the pandemic. Clinicians should prepare for treating an increasing number of parents of adolescents in their practices and ensure provision of additional skills that can be used to

address clinical levels of anxiety and depressive symptoms in this 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 study involving human participants was approved by the Texas Tech University Institutional Review Board (IRB2020-607). Participants provided informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

DM: data analyses and full manuscript write-up. CH: data analyses and manuscript revisions. PI: conceptual guidance and manuscript revisions. CR: design and funding of project, analysis guidance, and manuscript revisions. All authors contributed to the article and approved the submitted version.

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# Problems or prospects? Being a parent in the early phase of the COVID-19 pandemic in Germany

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**Background:** In the early phase of the COVID-19 pandemic, many restrictions hit people in ways never seen before. Mental wellbeing was affected and burden was high, especially for high-risk groups such as parents. However, to our knowledge no research has yet examined whether being a parent was not only a risk for psychological burden but also a way to cope with the COVID-19 pandemic.

**Methods:** An online survey was used to collect data from 1,121 participants from April to June 2020. In addition to demographic variables, risk factors (financial burden, problems complying with COVID-19 restrictions, and pre-treatment due to mental health problems) and protective factors (emotion regulation, humor, and crisis self-efficacy) were collected. The dataset was divided into three groups: parents whose children lived at home ( $n = 395$ ), parents whose children did not (no longer) live at home ( $n = 165$ ), and people who were not parents ( $n = 561$ ).

**Results:** A linear mixed effect model showed that parents had no higher burden than non-parents, and even less when children did not live at home. Expected risk factors were generally less important, and there were no differences between parents and non-parents. In contrast, parents had advantages in protective factors.

**Conclusion:** In the early phase of the COVID-19 pandemic, it was shown that parents (with and without their children at home) were not necessarily at risk due to additional burden, but also had prospects of coping better with the situation than people without children.

## KEYWORDS

COVID-19, parents, risk factors, protective factors, psychological burden

## Introduction

In March 2020, the World Health Organization declared the spread of the Corona Virus Disease 2019 (COVID-19) a global pandemic (World Health Organization, 2020). As a result, several governments responded with public health measures and restrictions to prevent the spread of the Severe-Acute-Respiratory-Syndrome-Corona-Virus-2 (SARS CoV-2). These measures included travel restrictions, social distancing and closures of workplaces, daycare centers, schools and universities. A negative influence on mental health due to the pandemic and the accompanying restrictions has been shown (Wang et al., 2020; Xiong et al., 2020; Fountoulakis et al., 2022). However, countries under consideration differed in the burden experienced, which is why no general statement can be made. Rather, a specific consideration of countries and their measures is required (Wang et al., 2021). Reasons for the observed burdens are diverse, including restrictions or limitations due to social distancing. Social distancing was found to be a risk factor for depression, generalized anxiety disorder, insomnia, and stress in the initial phase of the COVID-19 pandemic (Hoffart et al., 2020; Marroquín et al., 2020). In summary, the early phase of the COVID-19 pandemic showed a reduction in general wellbeing and an increase in affective and stress-related symptoms.

Especially in subgroups like parents, the COVID-19 pandemic seems to have a tremendous impact on wellbeing (Gamonal-Limcaoco et al., 2021; Huebener et al., 2021; Russell et al., 2021), with parents reporting more feelings of burnout and more mental health issues than non-parents (Elder and Greene, 2021; Alonzo et al., 2022).

During the pandemic, parents experienced a double burden: In addition to their own restrictions, they were also affected by those of their children, such as home schooling, the effects of their children's social distancing (Clemens et al., 2020), or the omission of previous coping strategies they engaged in as a family (Petretto et al., 2020). Overall, financial worries, lack of social support and the balance between home office, parenting, and education were very stressful burdens for parents (Chung et al., 2020; Fontanesi et al., 2020). A recent study also found that parents, whose children had home schooling, had higher psychological distress compared to parents, whose children had no home schooling, or parents who did not have school-age children (Calear et al., 2022). Additionally, an Italian study with children and adolescents showed that in particular parents with higher levels of education might be exposed to higher stress due to home schooling. The reason for this could be that parents with a higher level of education have jobs that enable remote work, which in turn has to be coordinated with home schooling (Oliva et al., 2021). Following the onset of the pandemic, parents consistently showed increased stress levels (Miller et al., 2020), with an additional study finding that over 75.0% of parents reported moderate stress levels (Susilowati and Azzasyofia, 2020). Furthermore, parents also

reported an increase in negative feelings such as depression or anxiety (Brown et al., 2020; Galindo-Vázquez et al., 2020; Wu et al., 2020; Achterberg et al., 2021; Calvano et al., 2021). These psychological burdens can go even beyond a clinical threshold as the prevalence of severe mental illness was found to be 44.3% among Canadian parents with children under 18 in their own household (Gadermann et al., 2021). Similarly, a Chinese parent sample showed that burdens were lower if children were older (college students) in comparison to having younger children (other levels of children's educational status) (Wu et al., 2020). These findings imply differences depending on the care required and parenting responsibilities which in turn depend on whether children are younger or older, already in college, or no longer living at home. Thus, parents whose children live at home may be generally more at risk for increased burden due to the COVID-19 pandemic and its consequences than parents whose children no longer live at home. This burden is likely to be expressed particularly in symptoms of depression and anxiety, as previous consideration of the impact of the COVID-19 pandemic has shown (Grover et al., 2020; Wang et al., 2020). In turn, psychological distress of parents due to COVID-19 can have a negative influence on the emotional and behavioral wellbeing of their children (Dalton et al., 2020).

In addition to being a parent itself, there are other risk factors that could increase mental burden associated with the COVID-19 pandemic that have a particularly amplifying effect on parents. For many people, lockdown has been associated with reduced income, for example, in a study conducted in Vietnam, 66.9% had a reduction in their household income in the beginning of the pandemic (Tran et al., 2020). Decreased income has been shown as a risk factor for mental health (Duarte et al., 2020). In this regard, foster parents were found to be at higher risk for parental stress due to income insecurity (Miller et al., 2020). Apart from a financial constraint, more general constraints also proved to be influential. The wellbeing of parents is influenced by an increased perception of the difficulties and problems caused by the restrictions (Spinelli et al., 2020). Mental illness in parents diagnosed prior to the COVID-19 pandemic was also associated with increased depression and anxiety symptoms during the early phase of the pandemic (Wu et al., 2020). Therefore, specific consideration of financial constraints, difficulties in coping with the restrictions due to the COVID-19 pandemic, and prior treatment due to mental illness is useful to differentially assess the risk of parents, with or without children at home, compared to those who are not parents.

In contrast to the increased risk, however, there are also benefits to being a parent when it comes to mental health (Nomaguchi and Milkie, 2003). The extent to which being a parent may have had a protective effect during the early COVID-19 pandemic should therefore also be examined. Of particular interest in this context is self-efficacy in crises, to which the COVID-19 pandemic can appropriately be counted.

Among other aspects, crisis self-efficacy is positively moderated by the status of being a parent (Tip et al., 2020). This may result from parents' experience that crises always occurred, but could usually be overcome. In particular, feelings of control and self-efficacy have been shown to be protective during COVID-19 quarantine for parents (Brown et al., 2020; Wu et al., 2020). Especially, crisis self-efficacy, as well as emotion up-regulation strategies, showed beneficial effects in the early phase of the COVID-19 pandemic (Schelhorn et al., 2022), but with no regard to the status of being a parent. Self-care and the psychological flexibility to recognize situational demands and to react adaptively also serve as resilience factors for strengthening mental health (Coyne et al., 2020). Since emotion regulation seems to differ between parents and non-parents (Rutherford et al., 2015), emotion regulation strategies could thus have a crucial protecting influence for parents during the COVID-19 pandemic. Moreover, adaptive emotion regulation strategies for stress reduction and recovery seem to have a decisive positive influence on self-perception, partnerships, family and working life during the COVID-19 pandemic (Restubog et al., 2020). Therefore, it seems reasonable to consider the possible influence of the use of emotion regulation strategies differentiated for people with/without children. Another protective factor against stress seems to be the use of humor (Martin et al., 2003), as humor has potentially positive effects on physical and psychosocial health and wellbeing (Lefcourt, 2001; Martin, 2001). During the COVID-19 pandemic, humor was shown to transmit positive emotions (Amici, 2020), with self-enhancing humor as a style especially leading to reduced hopelessness and lower stress levels (Olah and Ford, 2021). Whether there is a difference in humor depending on parental status has not been investigated in detail as of now and is deserving of examination. It may be that parenting contributes to self-enhancing humor and thus serves as a protective factor also during the pandemic. Thus, there are several aspects that may have been protective at the onset of the pandemic and therefore are important to include in a closer look at the burden on parents and non-parents.

While several studies investigated psychological burden in parents as well as related factors increasing or decreasing burden during the COVID-19 pandemic, no study has, to our knowledge, specifically compared parents with children living at home with those whose children do not live at home and with non-parents. Additionally, the inclusion of not only risk but also protective factors of parents could shed further light on the nature of the differences between these three groups. Providing data from a German sample during the first phase of the COVID-19 pandemic also contributes to a better understanding of potential cross-country differences and similarities.

Based on the risk factors (financial burden, restrictions, previous treatment due to mental illness) outlined above, we hypothesized that parents with children living at home

were more burdened due to the COVID-19 pandemic and its consequences than parents whose children do not live at home or people without children. In addition, based on the potential protective factors of parenthood (crisis self-efficacy, emotion regulation, humor), we expected parents whose children did not live at home to have a protective advantage over people without children.

## Methods

### Study design

A cross-sectional design was used to collect survey data in a web-based questionnaire. The data was collected between April 15 and June 3, 2020. General lockdown measures were introduced in Germany on 22 March 2020 and started loosening on 20 April 2020. For a simplified overview of lockdown measures across the German federal states in which restrictions varied, the restrictions of contacts (85.71% with restriction), schools (37.65% with restriction) and restaurants (84.37% with restriction) on the respective survey day were used.

### Sample

Participants were recruited *via* flyers, social online platforms, mailing lists and notices in in-patient clinics and supermarkets. The raw dataset contained 2,506 participants with usable data for statistical analysis. Inclusion criteria were: living in Germany and a sufficient understanding of German language to answer the questions. Exclusion criteria were age younger than 24 years (oriented toward the youngest parent), unrealistic or missing values as well as not living in Germany during the restrictions. The final sample contained 1,121 complete datasets (72.70% female, age range = 24–88 years,  $M = 40.33$ ,  $SD = 13.38$ ). The majority of participants were employed (60.57%) and it was a highly educated sample, with over 54.30% possessing at least a bachelor's degree. Participants were distributed across Germany with the majority living in Lower Saxony (25.42%) and Bavaria (22.57%). This high proportion of recruited participants in these federal states results from recruitment locations in these federal states. All participants gave their informed consent for participation and completing the questionnaires electronically. An indication of the e-mail address for a participation in follow-up measurements was voluntary. Data was collected anonymously without IP addresses or GPS tracking. This study was approved by the Ethics Committee of the Department of Psychology at the PFH Private Hochschule Göttingen (Ethics application number: 251982).

## Subsamples

The sample was divided into 3 groups: participants whose children lived with them in the household (“parent with child at home,”  $n = 395$ ), participants whose children no longer lived with them in the household (“parent without child at home,”  $n = 165$ ) and participants without children (“no parent,”  $n = 561$ ). A demographic overview of each group is depicted in [Table 1](#). Some descriptive characteristics can be identified here. The group “no parents” had a higher proportion of bachelor’s degrees in education, a higher proportion of students and a younger average age. On the other hand, the group “parent without child at home” is the group with the oldest average age, the lowest education level and the highest proportion of retired participants. Thus, it seems that the groups not only differ in whether they have children (at home), but are also in other stages of life. Thus, controlling for these variables seems to be of great relevance.

## Measures

### Psychological burden

Psychological burden was assessed with the self-report questionnaire ICD-10-Symptom-Rating (ISR; [Tritt et al., 2008](#)). The ISR is used as a diagnostic screening instrument in German-speaking countries. In total, the ISR contains 29 items based on the diagnostic criteria of the ICD-10 ([Tritt et al., 2008](#)). The five symptom subscales depression (example item: “When I want to do something I lack energy and get tired quickly”), anxiety (“Just thinking about a possible anxiety attack scares me”), eating disorder (“I spend a lot of time thinking of ways to lose weight”), obsessive-compulsive disorder (“I try to resist reoccurring, seemingly senseless thoughts and actions, but often don’t succeed”), and somatoform disorder (“I worry about having a serious physical illness”) are formed from 3 to 4 items each, 12 additional items are used to screen for individual syndromes such as derealization. All items were rated on a 5-point Likert-scale from 0 to 4, with 0 indicating “does not apply” and 4 indicating “applies extremely.” The item scores are averaged for each subscale and the subscales can be added to form a total score. The period surveyed is the last 2 weeks, which is an optimal period considering pre-existing restrictions. The reported internal consistency for the total score is very good (Cronbach’s  $\alpha = 0.92$ ), with slightly lower but still good consistency for the subscales (Cronbach’s  $\alpha = 0.78$ – $0.86$ ). The reliability of the ISR is satisfactory ([Fischer et al., 2011](#)). A strong association ( $r = 0.84$ ) between the total score of the ISR and the Global Severity Index of the Symptom-Checklist-90-R (SCL-90 R; [Franke, 2002](#)) also confirmed the validity of the ISR ([Tritt et al., 2010](#)). Strengths of the ISR are its brevity and its pragmatic approach to good scientific quality criteria.

Possible protective factors against negative effects of COVID-19 risk and associated restrictions were assessed by the three constructs: emotion regulation, humor, and crisis self-efficacy.

### Emotion regulation

Due to the lack of instruments for the simple measurement of emotion regulation strategies, a self-constructed questionnaire with 8 items was used to assess up-regulation of pleasant emotions. Construction was based on the process model of emotion regulation by [Gross \(2014\)](#). In particular, strategies present already “before the event,” and formulations introduced by [Quoidbach et al. \(2010\)](#) for savoring strategies were used. Accordingly, half of the items addressed savoring of pleasant emotions, the other half addressed up-regulation of pleasant emotion through pre-event strategies. All items were set in relation to the pandemic and subsequent restrictions and had to be answered on a 5-point Likert-scale from “does not apply” to “applies extremely.” The answers were averaged for further analyses. The internal consistency of the used items was very good in our sample, with Cronbach’s  $\alpha = 0.92$ .

### Humor

The potential positive influence of humor as an adaptive coping strategy was assessed using the subscale “self-enhancing humor” of the Humor Styles Questionnaire by [Martin et al. \(2003\)](#). This distinct humor style is measured via an 8-item subscale, of which 2 items were not used due to bad fit with the context of the restrictions (“...amusing aspect of a situation...” and “I don’t need to be with other people...”). Answers were made on a 7-point Likert-scale, ranging from “totally disagree” to “totally agree.” The items were averaged to a score. Self-enhancing humor was found to be negatively associated with depression and anxiety ([Martin et al., 2003](#); [Kuiper et al., 2004](#)). For the German version, internal consistency for this subscale was found to be good with Cronbach’s  $\alpha = 0.83$ , factorial validity was also confirmed ([Ruch and Heintz, 2016](#)). Internal consistency in our sample was good, Cronbach’s  $\alpha = 0.80$ .

### Crisis self-efficacy

To assess the possible influence of participants’ belief of self-efficacy, a translated extract of the crisis self-efficacy index ([Park and Avery, 2019](#)) was used. This was done using 4 of the original 12 items, one of each of the 4 factor fractures that had the highest load on the factor. The items were answered on a 7-point Likert-scale, from “strong disapproval” to “strong approval.” Thereby, the four factors of the index (action, preventive, achievement, and uncertainty management) could be assessed shortly and combined into an average score. In our sample, the used items showed low intercorrelations, suggesting a good divergence

TABLE 1 Demographic characteristics of subsamples.

Variable	Groups		
	Parents with children at home	Parents without children at home	No parents
<b>Age</b>			
<i>M</i> ( <i>SD</i> )	44.00 (9.81)	58.68 (9.49)	32.35 (9.55)
Range	24–82	33–82	24–88
<b>Gender <i>n</i> (%)</b>			
Male	88 (22.28)	59 (35.76)	159 (28.34)
Female	307 (77.72)	106 (64.24)	402 (71.66)
<b>Education <i>n</i> (%)</b>			
Lower Secondary School	4 (1.01)	6 (3.64)	2 (0.36)
GCSE	24 (6.08)	23 (13.94)	24 (4.28)
Vocational Training	89 (22.53)	43 (26.06)	113 (20.14)
GCE	63 (15.95)	26 (15.76)	94 (16.76)
Bachelor's degree	50 (12.66)	21 (12.73)	167 (29.77)
Master's degree	154 (38.99)	43 (26.06)	151 (26.92)
Doctoral degree	10 (2.53)	3 (1.82)	8 (1.43)
<b>Children</b>			
<i>M</i> ( <i>SD</i> )	2.06 (0.95)	2.16 (1.40)	–
Range	1–6	1–10	
<b>Employment status <i>n</i> (%)</b>			
Employed	233 (58.99)	83 (50.30)	363 (64.71)
Self-employed	80 (20.25)	24 (14.55)	51 (9.09)
Civil servant	42 (10.63)	15 (9.09)	43 (7.66)
Student / Trainee	30 (7.59)	3 (1.82)	149 (26.56)
Unemployed	17 (4.30)	7 (4.24)	11 (1.96)
Retired	9 (2.28)	45 (27.27)	15 (2.67)
Maternity protection, Parental leave	27 (6.84)	–	1 (0.18)

GCSE, General Certificate of Secondary Education; GCE, General Certificate of Education. In education, *n* = 1 missing for group “parents with child at home” and *n* = 2 missing for group “no parents.” Multiple choices possible in employment status.

between the items. Internal consistency was acceptable for our sample, with Cronbach's  $\alpha = 0.69$ .

## Statistical analysis

Statistical analyses were conducted using the R statistical package, version 4.0.2 (R Core Team, 2021) for linear mixed effect models (LMEs), and SPSS 28 (IBM Corp Released, 2021) otherwise. In order to assess which factors contributed to an increased ISR sum score during the early phase of COVID-19 pandemic, LMEs were computed through the *lme4* package in R (Bates et al., 2015). LMEs have several advantages compared to other means of analyses, among them robustness with unequal sample sizes and missing data, and non-normally distributed dependent variables (Judd et al., 2017). Furthermore, LMEs can include random effects and assess additional variability where some groups have fewer entries than others (i.e., in education).

*P*-values were computed via *t*-tests using the Satterthwaite approximation to degrees of freedom via the package *lmerTest* (Kuznetsova et al., 2017). Additionally, the package *r2glmm* (Jaeger et al., 2017) aided in determining  $R^2$  for fixed effects including confidence intervals for effect sizes.

In a first step, the ISR sum score was used as a dependent variable, followed by models with the ISR depression score and the ISR anxiety score as dependent variables. Independent variables were chosen based on bi-variate correlations (Kendall's  $\tau$ ) between the outcome measure and the covariates humor, emotion regulation strategy, crisis self-efficacy, and age. Factors were chosen according to the criteria (a) relevance to mental health, (b) relevance during the COVID-19 pandemic and (c) being descriptive of the population. Additionally, Mann-Whitney *U* tests (2 categories) and Kruskal–Wallis *H* tests (3 and more categories) were computed to determine significant differences in the outcome variables depending on categories. Factors with more than two categories were recoded as dummy



variables. For group assignment, being a parent with child at home was chosen as the reference category.

In order to calculate effect sizes for individual model terms, the semi-partial (marginal)  $R^2$  by Jaeger et al. (2017) is reported in addition to confidence intervals. Effect sizes of 0.14 are interpreted as large effects, 0.06 as medium effects, and 0.01 as small effects. All models followed best practice recommendations for model-fitting (Barr, 2013), beginning with a null model including a random intercept which is then compared to a maximized model. In a final step, a reduced model was computed and compared to both the null and the maximized model. Model indices were the Akaike Information Criterion (AIC: Akaike, 1974), the Bayesian Information Criterion (BIC: Schwarz, 1978) and the log likelihood ratio (LR) statistic. In the end, the model with the lowest AIC and BIC values that was significantly different from the null model was chosen. The general modeling strategy was the following:

$$\begin{aligned} \text{ISR\_Score} \sim & \text{age} + \text{sex} + \text{no parent} + \text{parent no child} \\ & + \text{reduction in income} + \text{COVID compliance} \\ & + \text{humor} + \text{emotion strategy} + \text{crisis efficacy} \\ & + \text{psych treatment} + (1|\text{education}) \end{aligned} \quad (1)$$

Where *no parent* refers to the group of participants that are not parents, *parent no child* refers to the group of participants that are parents but where children are not living at home; *reduction in income* refers to reduced income during the lockdown; *COVID compliance* refers to difficulties complying with the COVID-19 restrictions; *humor* refers to the self-enhancing humor score; *emotion strategy* refers to the emotion strategy total score; *crisis efficacy* refers to the crisis self-efficacy score; and *psych treatment* refers to whether participants have been in treatment for a psychiatric disorder before. Treatment was defined as ambulant therapy for a duration of at least three months or stationary therapy for at least two weeks. As a final step, education was added as a random effect as comparable values were expected within educational groups. Additionally, group differences in protective variables (crisis self-efficacy score, self-enhancing humor score and emotion regulation score) were computed using Kruskal–Wallis tests, followed by *post-hoc* tests. Multiple comparisons were corrected for using the False Discovery Rate (FDR) correction (Benjamini and Hochberg, 1995) and the *p*-value was set to 0.05.

## Results

In the examined sample, more than half of the participants showed inconspicuous total ISR values, but several participants scored above clinical cut-offs. Non-parents had the highest percentage with low to severe symptom burden in the total ISR score (40.50%,  $n = 226$ ), followed by parents with children at

home (30.79%,  $n = 121$ ) and finally parents without children at home with the lowest values (27.44%,  $n = 45$ ).

In order to determine independent variables suitable for LMEs predicting ISR scores, bi-variate correlations were computed (see Table 2). The ISR sum score was significantly correlated with age ( $\tau = -0.14$ ,  $p < 0.001$ ), COVID compliance ( $\tau = 0.17$ ,  $p < 0.001$ ), humor ( $\tau = -0.13$ ,  $p < 0.001$ ), emotion strategy ( $\tau = 0.13$ ,  $p < 0.001$ ) and crisis efficacy ( $\tau = -0.25$ ,  $p < 0.001$ ). Identical patterns could be observed for the specific ISR scores for depression and anxiety. For categorical variables, significant differences in the ISR sum score could be observed for the variables sex ( $U = 96468.00$ ,  $z = -3.67$ ,  $p < 0.001$ ), income ( $H_{(2)} = 13.27$ ,  $p < 0.001$ ), group ( $H_{(2)} = 10.78$ ,  $p = 0.005$ ) and psychological treatment ( $U = 43550.50$ ,  $z = -9.80$ ,  $p < 0.001$ ). Significant differences in the ISR subscale depression were found for income ( $H_{(2)} = 15.58$ ,  $p < 0.001$ ), sex ( $U = 99738.50$ ,  $z = -2.97$ ,  $p = 0.003$ ), group ( $H_{(2)} = 10.81$ ,  $p = 0.004$ ), and psychological treatment ( $U = 49879.50$ ,  $z = -8.19$ ,  $p < 0.001$ ). For the ISR variable anxiety, differences were observed for income ( $H_{(2)} = 10.02$ ,  $p = 0.007$ ), sex ( $U = 94589.50$ ,  $z = -3.54$ ,  $p < 0.001$ ), and psychological treatment ( $U = 56282.50$ ,  $z = -7.23$ ,  $p < 0.001$ ). Accordingly, these variables were added into the LMEs for the respective ISR variable.

## Linear mixed effect models

LMEs were fit with the total ISR score and the specific scores for depression and anxiety as dependent variables and correlated metric variables and significant categorical variables as possible predictors. Education was added as a random effect in every LME. The null model was compared to a maximized model including all relevant predictors, followed by a reduced model only including significant predictors. This was done in order to achieve a parsimonious model. Model comparisons for all 3 LMEs are depicted in Table 3.

With the exception of the ISR anxiety score, the reduced model was to be preferred over the maximized model. Significant predictors for the ISR sum score were age, COVID compliance, being a parent without children at home, reduction in finances, the self-enhancing humor score, the emotion regulation strategy score, crisis self-efficacy score and prior psychological treatment. Significant predictors for the ISR depression score were a reduction in finances, COVID compliance, the self-enhancing humor score, the emotion regulation strategy score, the crisis self-efficacy score and prior psychological treatment. Finally, for the ISR anxiety score, significant predictors were age, the emotion regulation strategy score, the crisis self-efficacy score and prior psychological treatment. The respective LMEs and predictors are depicted in Table 4.

As the crisis self-efficacy score, the self-enhancing humor score and the emotion regulation strategy score played an important role for the prediction of the ISR, group differences

TABLE 2 Correlations between LME variables.

	ISR depression	ISR anxiety	Age	Difficulties with restriction compliance	Self- enhancing humor	Emotion regulation	Crisis self- efficacy
ISR sum score	0.651*	0.583*	−0.142*	0.173*	−0.127*	0.134*	−0.248*
ISR depression		0.417*	−0.134*	0.263*	−0.174*	0.073*	−0.261*
ISR anxiety			−0.105*	0.075*	−0.098*	0.132*	−0.241*
Age				0.003	0.069*	−0.068*	
Difficulties with restriction compliance					−0.067*	0.039	−0.087*
Self-enhancing humor						0.197*	
Emotion regulation							0.211*
							0.019

\*  $p < 0.001$ .

TABLE 3 Model comparisons of linear-mixed effect models predicting ISR scores.

Outcome variable	Model	AIC	BIC	logLik	$R^2$	vs. null model		vs. max model	
						$\chi^2$	$p$ -value	$\chi^2$	$p$ -value
ISR sum score	Null Model	1886.70	1901.60	−940.40	0.00				
	Max Model	1552.90	1622.50	−762.44	0.28	355.84	<0.001		
	Reduced Model	1548.00	1602.7	−763.01	0.28	354.71	<0.001	1.13	0.768
ISR depression	Null Model	2803.10	2818.00	−1398.50	0.00				
	Max Model	2391.8	2456.50	−1182.90	0.34	431.24	<0.001		
	Reduced Model	2387.30	2447.0	−1181.70	0.34	428.23	<0.001	3.00	0.391
ISR anxiety	Null Model	2679.92	2694.84	−1337.00	0.00				
	Max Model	2449.30	2504.00	−1213.60	0.21	246.65	<0.001		
	Reduced Model	2452.90	2487.80	−1219.50	0.20	234.99	<0.001	11.65	0.020

ISR = ICD-10-Symptom-Rating. The null model refers to a random-slope-only model. The max model refers to a model including all predictors and the reduced model only includes significant predictors from the max model.

in the respective scores were computed using Kruskal–Wallis tests, followed up by *post-hoc* tests. See Figure 1 for a detailed depiction of the group comparisons.

## Discussion

The aim of this study was to investigate whether parents show greater psychological burden associated with the early COVID-19 pandemic and its counter measures, than people without children (at home). The psychological burden of parents with children at home was considered in relation to possible risks (financial burden, problems with COVID-19 restrictions, and previous psychological treatment) and protective factors (emotion regulation, humor, crisis self-efficacy) and compared to people without children and parents whose children no longer live at home.

Our model showed that the status of “being a parent” is neither a risk nor protective in general but has to be considered differentially whether children live at home or not. It can be assumed that the majority of children who live at home are also younger and therefore need more supervision and care. Accordingly, our model shows that “being a parent” is negatively associated with psychological burden when children are not at home compared to when they are. This is in line with previous findings, suggesting that children who no longer live at home may play a supporting role for their parents (Wu et al., 2020). There were no differences between people who are not parents and parents with children at home, which was unexpected. This may be due to the heightened burden of young people in the early phase of the COVID-19 pandemic (Glowacz and Schmits, 2020; Hawes et al., 2021) considering on average people without children were younger in our sample. Furthermore, this negative

TABLE 4 Main fixed effects of interest within LMEs predicting ISR scores.

	Fixed effect	Estimate	SD	<i>t</i>	<i>p</i>	$R^2_{\beta^*}$	$R^2_{\beta^*}$ CI
ISR sum score	Age	−0.01	0.00	−3.65	<0.001	0.01	0.00–0.03
	Difficulties with COVID-19 compliance	0.09	0.02	5.28	<0.001	0.03	0.01–0.05
	Parent, kid not at home	−0.06	0.03	−2.17	0.030	0.00	0.00–0.02
	Reduction in income	−0.04	0.02	−2.14	0.032	0.00	0.00–0.02
	Self-enhancing-humor	−0.01	0.00	−2.70	0.007	0.01	0.00–0.02
	Emotion regulation strategy	0.01	0.00	5.98	<0.001	0.03	0.02–0.06
	Crisis self-efficacy	−0.05	0.00	−11.85	<0.001	0.12	0.08–0.15
	Previous psychological treatment	−0.13	0.02	−6.47	<0.001	0.04	0.02–0.06
ISR depression	Age	−0.01	0.00	−4.04	<0.001	0.02	0.00–0.03
	Reduction in income	−0.06	0.03	−2.47	0.014	0.01	0.00–0.02
	Difficulties with COVID-19 compliance	0.26	0.03	9.93	<0.001	0.09	0.06–0.12
	Self-enhancing-humor	−0.02	0.00	−3.47	<0.001	0.01	0.00–0.03
	Emotion regulation strategy	0.01	0.00	3.75	<0.001	0.01	0.00–0.03
	Crisis self-efficacy	−0.07	0.01	−11.71	<0.001	0.11	0.08–0.15
	Previous psychological treatment	−0.21	0.03	−6.63	<0.001	0.04	0.02–0.07
ISR anxiety	Age	−0.00	0.00	−2.51	0.012	0.01	0.00–0.02
	Sex	−0.04	0.03	−1.50	0.133	0.00	0.00–0.01
	Reduction in income	−0.04	0.03	−1.50	0.133	0.00	0.00–0.01
	Difficulties with COVID-19 compliance	0.05	0.03	1.95	0.051	0.00	0.00–0.01
	Self-enhancing-humor	−0.01	0.00	−1.59	0.113	0.00	0.00–0.01
	Emotion regulation strategy	0.02	0.00	4.67	<0.001	0.02	0.01–0.04
	Crisis self-efficacy	−0.06	0.01	−10.59	<0.001	0.09	0.06–0.13
	Previous psychological treatment	−0.16	0.03	−5.08	<0.001	0.02	0.01–0.04

LME, Linear Mixed Effect Model; ISR, ICD-10-Symptom-Rating; CI, Confidence Interval.

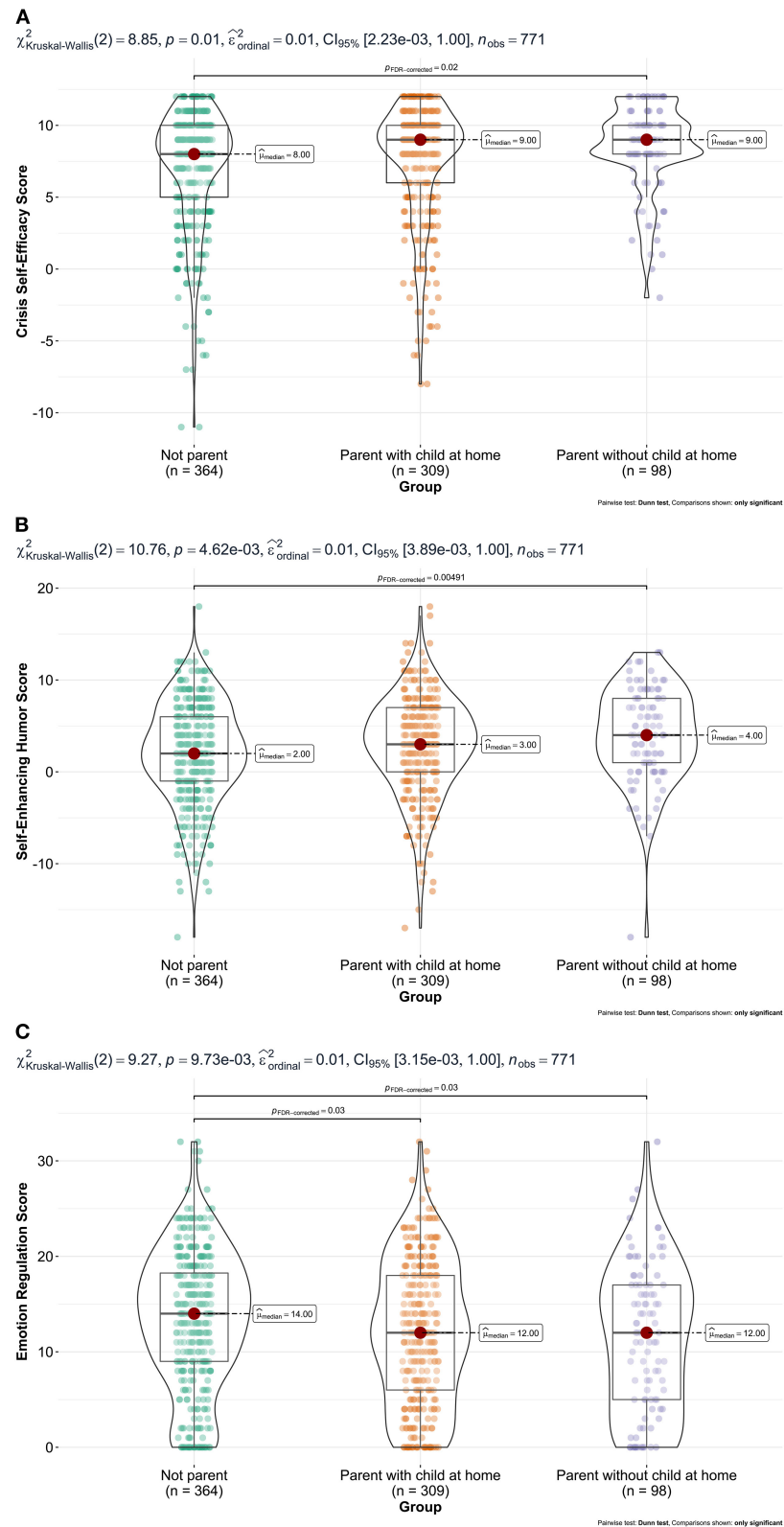
predictor only accounted for the total burden score, not in the specific areas of depression or anxiety. Thus, being a parent seems not to be associated with a greater risk for psychological burden due to the early phase of the COVID-19 pandemic in comparison to not being a parent, whereas being a parent without children at home represented a protective factor.

Age was found to be a weak negative predictor; higher age was associated with a lower total ISR score, as well as with lower depression and anxiety scores. Relating to resilience, age has been shown to have a positive age-affect relationship (Mroczek and Kolarz, 1998) which could have been protective. Besides, emotional wellbeing tends to increase with age (Charles and Carstensen, 2010). Therefore, it seems reasonable that the impact of the early phase of the COVID-19 pandemic on psychological burden was negatively associated with increasing age. An analysis of data from a community sample also showed that middle-aged adults were less mentally burdened than young adults at the beginning of the COVID-19 pandemic (Pothisiri and Vicerra, 2021).

Sex was not a relevant predictor of overall psychological burden, with the exception of anxiety symptoms. In the present study, a negative relationship between male sex and psychological burden could be found, with men having lower anxiety symptoms than women. This is in line with previous

research during the COVID-19 pandemic (Galindo-Vázquez et al., 2020; Luceño-Moreno et al., 2020).

Looking at potential risk factors (i.e., financial burdens due to the COVID-19 pandemic and its restrictions, difficulties in compliance with the restrictions due to COVID-19 or previous psychological treatment), a rather mixed pattern emerged: A reduction in income was shown to be a positive predictor of psychological distress—overall, as well as specifically for depression and anxiety. *Post-hoc* analyses showed no differences between the three groups. However, this counterintuitive direction may be due to several factors. First, a majority of participants had either less or unchanged income due to the COVID-19 crisis in our survey. Thus, an increase in income cannot be interpreted here in relation to psychological burden. Second, the effect of experiencing less psychological burden with less income might be explained *via* German government programs. Thus, employment and a majority of previous income was secured, even though individuals were not able to engage in employment for a certain period of time. This may have had a relieving effect at the beginning of the pandemic which fits in with the relevant depression and anxiety domains. Though it seems not possible to estimate the long-term effect of the reported financial changes, a study in Germany conducting data a few weeks after the end of this survey (July and August 2020)



**FIGURE 1**  
Group comparisons for (A) crisis self-efficacy, (B) self-enhancing humor, and (C) emotion regulation.

did indeed show a higher burden in depressive symptoms among students with reduced income (Kohls et al., 2021).

Further, difficulties in compliance with restrictions due to the COVID-19 pandemic was a positive predictor of psychological burden. *Post-hoc* analyses showed no differences between the three groups. People who suffered from restrictions such as social distancing or closed shops also had higher scores in total psychological burden, depression and anxiety. Accordingly, a study from Hong Kong at the beginning of the COVID-19 pandemic also showed that problems in compliance with COVID-19 restrictions were associated with higher depression and anxiety scores (Zhao et al., 2020).

Previous psychological treatment was shown to be a negative predictor of psychological burden overall and in particular for depression and anxiety domains during the early COVID-19 pandemic. *Post-hoc* analyses identified no differences between the three groups. Thus, earlier psychological treatment was a protective factor rather than a risk with no differences for (non) parents. Earlier treatment may have helped to develop coping strategies which were also helpful during the pandemic. Nevertheless, this statement refers only to previous psychiatric pretreatment. Individuals with existing mental illness at the COVID-19 outbreak are considered a high-risk group (Neelam et al., 2021) and should therefore be monitored with appropriate attention.

In addition to potential risks, potential protective factors (i.e., emotion regulation, self-enhancing humor, and crisis self-efficacy) and their potential differential effects on the different groups were also assessed.

The use of emotion regulation in the sense of up-regulation of positive emotions was found to be a positive predictor with a very small effect on psychological burden (total score as well as depression and anxiety). That the ability and use of an adaptive emotion regulation strategy is associated with higher psychological burden is unexpected and contrary to previous findings for adaptive cognitive emotion regulation strategies and wellbeing (Gubler et al., 2020). It is conceivable that particularly burdened people first have to resort to this special strategy, whereas less burdened people can still manage without applying such a strategy. Interestingly, *post-hoc* analyses showed that parents with children at home used less up-regulation of positive emotions than people without children. Accordingly, Gambin et al. (2020) were able to show that difficulties in emotion regulation are not predictive of positive experiences in the parent-child relationship. There was no difference between parents with and without children at home.

As hypothesized, adaptive humor, especially self-enhancing humor, emerged as a negative, although weak predictor in our model. People with the tendency to handle situations humorously showed less psychological burden than others. This is in line with previous findings regarding the COVID-19 pandemic (Amici, 2020). *Post-hoc* analyses revealed that parents whose children do not live at home (anymore) show a higher score of self-enhancing humor than people without children.

Since our data are cross-sectional, it is not possible to conclude whether these differences are based on humor development through parenting or not. In any case, humor seems to have been a beneficial skill to cope with the burdens of the early COVID-19 pandemic.

As expected, crisis self-efficacy, as a measure that particularly applies in difficult, unusual situations, turned out to be a negative predictor in our model. A higher conviction of being able to overcome crises under own effort was thus associated with a lower value of psychological burden. In detail, parents whose children do not live at home (anymore) showed the highest score, followed by parents whose children live at home, while people without children having the lowest score. Unlike humor, there is certainly evidence of parents showing higher scores on crisis self-efficacy (Tip et al., 2020). This may also suggest that parents whose children do not live at home (anymore) have experienced this development for a longer period of time and thus have higher scores than parents whose children still live at home.

## Limitations

Several limitations of the study should be mentioned: First, about half of the data presented cover only 2 of the 16 federal states of Germany, i.e., Bavaria and Lower Saxony. This was due to increased recruitment in these two locations and should not have a significant impact on generalizability across Germany. In line with this, Schelhorn et al. (2022) did not show significant differences in psychological burden between the two states in an analysis of the same data used here. Second, the categorization into the three groups (parents with children at home, parents without children at home, and non-parents) omits information such as the number and age of children in the household, which could contribute to a more differentiated interpretation of risks and resilience within the respective groups of parents. However, data accessed in this study provide a first overview of the parental situation in regard to their psychological wellbeing during the early phase of the COVID-19 pandemic. In future studies, a more detailed analysis of these different groups of parents is clearly needed, as is a specification of potentially useful information regarding the children. For instance, it is not possible to say whether, in the case of parents whose children are not at home, the children have moved out to set up their own household or, for example, had to be temporarily placed in a care home. We consider this to be a negligible exception, however, it should be taken into account when interpreting the results. Third, the examined protective factors are based on scales that have been shortened (crisis self-efficacy), are a situationally appropriate shortened subscale of a questionnaire (self-enhancing humor), or are, theory-driven, self-generated (emotion regulation strategy). This limitation derives from the need for a survey that is comprehensive but short in order to gather as much information as possible in a low-threshold



manner. Despite the mentioned adaptations, the scales in this sample proved to be reliable (Cronbach's  $\alpha = 0.69\text{--}0.92$ ) and therefore very profitable. Fourth, since the sample was intended to represent as broad a picture of the community as possible, mental health diagnoses were neglected in general, and only severe mental distress with therapy attendance was recorded. On the one hand, this could have led to a certain proportion of mentally ill people among the participants, which must be taken into account when interpreting the ISR values. On the other hand, this in turn contributes to the improved generalizability of the results, since mental illnesses are part of society. Finally, it must be mentioned that this study is a cross-sectional excerpt. The insights obtained and predictors named can therefore only be interpreted with caution; no causal relationships can be derived. For causal interpretations, repeated measurements in the pandemic, distributed over a larger period of time, would be of particular value. Nevertheless, an overview of the investigated constructs during the first period of the COVID-19 pandemic is of particular importance due to the partly chaotic and unfamiliar nature of this period.

## Conclusion

The present results on the early phase of the COVID-19 pandemic examining psychological burden in Germany show that people were also able to access a number of protective factors. Parents in particular had advantages in addition to their specific risk factors, showing higher resilience in the areas of humor and crisis self-efficacy, and having to resort less to emotion regulation strategies compared to non-parents. In addition, the results generally reveal that, out of the expected risks, only difficulties in complying with COVID-19 restrictions were relevant, while financial burdens or previous mental health treatment were associated with lower psychological distress. Thus, being a parent is not a risk factor by itself, but must be considered differentially.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the corresponding author on request without undue reservation.

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## Ethics statement

The studies involving human participants were reviewed and approved by Ethics Committee of the Department of Psychology at the PFH Private University of Applied Science, Göttingen (Ethics application number: 251982). The patients/participants provided their written informed consent to participate in this study.

## Author contributions

Conceptualization and validation: AE, IJ, DS, IS, and YS. Data curation: AE, IJ, and YS. Formal analysis: IJ. Funding acquisition and resources: YS. Investigation: AE, IS, and YS. Methodology: AE, IJ, DS, IS, MM, TB, and YS. Project administration: AE. Software: ML and IJ. Visualization: AE and IJ. Supervision: SK. Writing—original draft: AE, IJ, and DS. Writing—review and editing: SK, MM, and TB. 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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# Back to live: Returning to in-person engagement with arts and culture in the Liverpool City Region

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On July 19th 2021, the UK government lifted the COVID-19 restrictions that had been in place since March 2020, including wearing masks, social distancing, and all other legal requirements. The return to in-person events has been slow and gradual, showing that audiences are still cautious when (and if) they resume engaging in arts and culture. Patterns of audience behavior have also changed, shifting toward local attendance, greater digital and hybrid engagement, and openness to event format changes. As the arts and cultural industry recovers from the pandemic, it is important to adopt an audience-oriented approach and look at the changing patterns of engaging in arts and culture. This study aims to better understand the impact of the pandemic on the patterns of cultural and arts engagement. Eight qualitative interviews were conducted to explore the changes in arts and cultural engagement since the restrictions were lifted, focusing particularly on the audience's experiences of returning to in-person arts and cultural events in the Liverpool City Region (LCR). Using framework analysis, three themes were identified from the data: *The new normal: reframing pre-pandemic and pandemic experiences of arts and culture*, *Re-adjusting to in-person provision*, and *Moving forward: online and blended provision*. The findings show that the pandemic altered the ways that people engage in arts and culture. The "new normal," a blend of pandemic and pre-pandemic experiences, illustrates how the pandemic has highlighted and reconfigured the importance of arts and culture, in terms of personal and cultural identity. Resuming in-person engagement after a long break, participants noted that they were able to feel more like themselves again. Arts and culture were perceived to be beneficial in rebuilding personal resilience and confidence. Engaging in arts and culture, following the isolating experience of the pandemic, has also helped participants feel reconnected to others through



their shared experiences. Finally, the findings suggest that online provision remains vital for many, ensuring wider inclusivity, particularly for vulnerable audiences. At the same time, it is important to acknowledge the barriers to online inclusion and the possibility of this resulting in a growing digital divide.

#### KEYWORDS

arts engagement, COVID-19, cultural industry, mental health, wellbeing, digital provision

## Introduction

As documented in numerous studies across the globe, the COVID-19 pandemic had a significant impact on mental health and wellbeing (Daly et al., 2020; Yamamoto et al., 2020; Niedzwiedz et al., 2021). There is some evidence to suggest that the pandemic has made pre-existing inequalities even more prominent. Some of the demographic groups whose mental health was disproportionately affected by the pandemic include young people (Singh et al., 2020; Yamamoto et al., 2020; Kwong et al., 2021), women (Daly et al., 2020; Niedzwiedz et al., 2021), black and ethnic minorities (Proto and Quintana-Domeque, 2021), as well as people from more socially disadvantaged backgrounds and those with pre-existing mental health conditions (Kwong et al., 2021; O'Connor et al., 2021). Both during and immediately after the lockdowns, people reported feelings of isolation, anxiety, COVID-19-related sleeplessness, as well as work and study difficulties as factors that had the most adverse effect on their mental health and wellbeing (Yamamoto et al., 2020).

Numerous benefits to engaging in arts and culture have been widely reported, including personal development, social cohesion, community empowerment, improved local image and identity, and promotion of imagination and vision (Matarasso, 1997). There is an established and well-researched link between regular engagement in arts and culture and mental health and wellbeing (Matarasso, 1997; Daykin et al., 2018; Fancourt and Finn, 2019) and it is that aspect of the value of arts and culture in people's lives with which this paper is principally concerned. There is also a growing body of evidence on the mental health and wellbeing benefits of engaging in arts during the pandemic. For example, engaging in hobbies such as reading and music has been associated with decreased depression and anxiety levels and increased life satisfaction (Bu et al., 2021; Cabedo-Mas et al., 2021). Higher levels of engagement in arts and culture also had a positive impact on people's resilience and ability to cope with adverse situations (Keisari et al., 2021).

During the COVID-19 pandemic, in-person engagement was affected by the national lockdowns that introduced a number of restrictions. The pandemic had a serious impact on the arts and culture industry since many organizations had

to suspend their in-person provision and move their activities online. On the 19th of July 2021, the UK government lifted the COVID-19 restrictions that had been in place in some form since March 2020, including wearing masks, social distancing, and all other legal requirements. As the arts and culture industry recovers from the effects of the pandemic, it is important to explore the changing patterns of engaging in arts and culture and adopt an audience-oriented approach moving forward (Radermecker, 2021).

As Sedgman (2016) notes in her text "Locating the Audience," "audiences" are never a simple monolith group. They can no longer be perceived as a homogenous group of passive receivers of arts and culture (Bishop, 2012) but instead are to be viewed as a dynamic group able to actively "engage, to attend, to co-create, to participate". The complexity and variety of audiences' experiences also makes them a somewhat difficult group to study. However, despite these challenges linked to audience research, it remains crucial to "hear audiences out" (Sedgman, 2016) and give them voice. As Kershaw (2001) suggests, engaging in arts and culture always holds a democratic potential, which is why the audiences' experiences should never be reduced to a passive consumption of arts.

Inevitably, the COVID-19 pandemic and the subsequent closures of arts and culture venues made the discussion of audience participation topical again. As lockdowns and the digitization of arts provision have transformed the interaction between arts and culture providers and their beneficiaries, it has become even more important to understand audiences and how they engage in arts and culture particularly during such turbulent times as a global pandemic. Focusing on the variety and complexity of the lived experiences of arts and culture engagement and the benefits derived from it during the pandemic, this paper uses the concept of audiences and beneficiaries interchangeably.

As recent studies demonstrate, the return to in-person events has been slow and gradual, showing that audiences are still cautious when they resume engaging in arts and culture (The Audience Agency, 2021). Moreover, the patterns of audience behavior have also changed, shifting toward more local attendance, greater digital and hybrid engagement, and openness to event format changes (The Audience Agency, 2021).



Remaining domestic COVID-19 regulations came to an end in February 2022 but the changed patterns of engagement could inform new ways of moving forward and help evaluate the impact of the pandemic on the arts and culture sector.

This paper undertakes the crucial task, therefore, of examining this transitional period in order to understand audience concerns and expectations moving forward. It looks at the specific changes in arts and cultural engagement occurring after the lifting of restrictions in the UK, focusing on the audiences' experiences of returning to in-person events, as well as their engagement with the continued hybrid and online arts and cultural provision in a specific geographical location—the Liverpool City Region (LCR).

Liverpool City Region has one of the highest concentrations of culture in the UK and the largest clustering of museums and galleries outside London. Culture, arts, and creativity are central to the city's identity (Belchem, 2006), and cultural capital is vital for the city region's economy. At the same time, the region had some of the poorest mental health outcomes in the UK prior to the pandemic and the pre-existing regional inequalities between the North and the rest of the country were exacerbated by the pandemic, resulting in a significant decrease in mental and financial wellbeing in the North West (NHSA, 2021). In LCR almost one in five (19.4%) of the population aged 16+ has a common mental disorder, compared to the national average of 16.9% (Liverpool John Moores University, Public Health Institute, 2021).

The LCR is home to several successful programs harnessing arts for mental health care through partnerships between culture and health providers (Billington et al., 2013; Burns, 2017). During the pandemic, the arts and cultural organizations in the region proved to be a “lifeline” for many people, offering a much-needed way to combat isolation and stress (Worsley et al., 2022). This combination of factors highlights the LCR as a distinctive case study for identifying how arts and culture supported mental health and wellbeing following the conclusion of lockdown.

## Materials and methods

Qualitative semi-structured phone and online video call interviews were conducted in July and August 2021 following the full easing of COVID-19 restrictions in England. Interviews reflect on the experiences of in-person events, when there were no legal requirements to maintain any levels of restrictions. However, despite the lifting of national restrictions, during this time all venues had different safety measures in place (for example, some civic venues had restrictions in place until September 2021). Moreover, the criteria for arts and cultural engagement were wide and included a variety of experiences, ranging from live music performances to arts exhibitions and participation in a choir. This has inevitably translated into a

variety of participant experiences; the current study captured a wide range of engagement with arts and culture in the LCR.

## Ethical approval

Ethical approval was received from Liverpool University Research Ethics Committee (reference number 7994).

## Participants

Eight qualitative interviews (seven female and one male participant) were conducted. Participants were recruited *via* an advert disseminated through social media (project Twitter account) and published on the University of Liverpool website. The advert was also circulated by arts and cultural organizations in the LCR. Participants were interviewed *via* Zoom or by phone. All contacted participants agreed to take part in the study and provided informed written consent. For all eight participants, this was the third and final interview of the study. The current study builds upon findings of wave one and two data (Chapple et al., under review) that focus on the experiences of lockdown and during the initial restrictions easing. The longitudinal aspect of the wider study ensured a wide variety of data and explains why no further recruitment was needed for wave three.

## Data collection

This study was conducted throughout July and August 2021, after the lifting of restrictions in England on 19th July 2021. The interviews were conducted using a prepared topic guide that included questions about recent engagement in arts and culture in the LCR, particularly the return to in-person events, as well as online and hybrid engagement. Interviews duration ranged from approximately 20 to 45 min. The interviewer produced field notes during the interviews. The interviews were audio recorded and then transcribed verbatim using Otter.ai software. All interviews were conducted by the first author, a female postdoctoral researcher with prior training in qualitative and quantitative research methods.

## Analysis

Interview data were analyzed in NVivo version 12 using framework analysis (Ritchie and Spencer, 1994). Framework analysis was chosen because it allows for a combination of deductive and inductive data analysis particularly helpful for analyzing and comparing complex data sets. The procedure outlined by Gale et al. (2013) was followed. Familiarization

was reached *via* transcription, re-reading of the transcripts, and creating a memo file summarizing the key points of each transcript. Memo notes were shared with the wider team. Codes and categories from the previous waves of the study were used as an initial organizational framework to sort the data and identify any changes from previous data.

Three transcripts were read, coded independently, and discussed by two researchers to ensure inter-coder reliability. After agreement on codes was reached, all transcripts were coded line-by-line within NVivo. All codes were then grouped into categories, focusing on the changes observed in this dataset compared to previous waves (Chapple et al., under review), producing a working analytical framework. This framework was then applied to all transcripts through indexing. Following a discussion with the wider team, the themes and subthemes were edited and refined, resulting in a finalized analytical framework.

## Results

Three themes were identified from the interview data: *The new normal: reframing pre-pandemic and pandemic experiences of arts and culture*, *Re-adjusting to in-person provision*, and *Moving forward: online and blended provision*. Each theme comprised a number of subthemes (see Table 1).

### The new normal: Reframing pre-pandemic and pandemic experiences of arts and culture

#### Reconnecting to the sense of self

This subtheme reflects on arts as a way of reconnecting with one's identity, where the latter has been shaped by lifelong engagement in arts and culture. As previous research shows, arts and culture are ingrained in personal narratives for many

participants, making the limited access to arts and culture during lockdown particularly challenging and leading to a certain sense of loss of self-identity (Chapple et al., under review). During the transitional period of returning to live events, many participants have not yet been able to return to their pre-pandemic levels of engagement even as the restrictions were lifted. The sense of loss of arts and culture as a vital part of their identity remains a challenge:

*I still love looking at stuff and planning stuff. I haven't done that. Well, I stopped doing that completely, which is. . . A little part of my life has changed. Hopefully, it will come back? Definitely (P5).<sup>1</sup>*

Furthermore, participants also noted the long-term detrimental effect of the pandemic on their motivation, particularly when planning an event out, even though this used to be usual for them pre-pandemic:

*So those are the things I've instigated, but everything else has been somebody else and that's not usual for me. Normally, I love looking at what's on and then planning and going, I just haven't done it. I mean, I'm hoping to come back (P5).*

Despite the challenges mentioned above, as COVID-19 restrictions were lifted, some participants were able to return to in-person provision and thus, reclaim a part of their identity through arts and culture:

*Those cultural opportunities, they were the things that were motivating me to be able to be more myself (P6).*

#### Rebuilding confidence and resilience

As previous data show, engaging in arts and culture during the pandemic helped participants cope with isolation and stress (Chapple et al., under review). Data collected after the restrictions were lifted highlight the crucial role of arts and culture in instilling confidence and rebuilding resilience. As participants were able to engage in arts and culture in-person again, they reported that this experience, even if stressful at first, allowed them to gradually regain confidence in relation to attending other in-person events:

*Just doing it once increased my confidence. [. . .] I just think it's a question of just having a little bit of faith (P5).*

Furthermore, taking this kind of risk helped participants become more resilient, since their capacity to resume in-person arts and cultural engagement provided a positive example of

TABLE 1 Overarching themes and subthemes.

Themes	Subthemes
The new normal: reframing pre-pandemic and pandemic experiences of arts and culture	<ul style="list-style-type: none"> <li>• Reconnecting to the sense of self</li> <li>• Rebuilding confidence and resilience</li> <li>• Reconnecting with others through arts and culture</li> <li>• Reframing cultural identity (local and global blurred)</li> </ul>
Re-adjusting to in-person provision	<ul style="list-style-type: none"> <li>• Varied experiences of in-person events after restrictions lifted</li> <li>• Taking risks: varying levels of safety</li> <li>• Managing change during the transitional period</li> </ul>
Moving forward: online and blended provision	<ul style="list-style-type: none"> <li>• Navigating online content</li> <li>• Considerations around online inclusion</li> </ul>

<sup>1</sup> Participant.

how they were coping with the difficulties of the pandemic during this transitional time:

*I think it's really been a good thing for me because it's sort of got me into a better place, I think, to be able to handle what's going to be a sort of unusual state of things to come, you know, and to sort of make that transition. I think it's really helped actually (P6).*

This participant also provides an interesting perspective on risk-taking. During the pandemic, risk was reduced to issues of health and life, while previously it could also be perceived as something positive and humanizing:

*So in a way, some of these cultural things have actually helped me to be in a state that involves more risk in lots of different ways. It could just be that sense of an internal taking a risk. I don't mean to your health, I mean, you know, that sort of uncertainty type thing. And they're really important things to feel and to do. Because they're the things that make you human (P6).*

## Reconnecting with others through arts and culture

Participants' excitement in relation to a shared experience was prominent. Many took this as an opportunity to reconnect with their personal networks. Here, a participant talks about going to a museum in Liverpool together with a lifelong friend that they had not seen for a long time:

*On Saturday, I've got a friend from Yorkshire. We used to go to school together. She lives in Yorkshire now. But she's coming over on Saturday to come back to Liverpool for the day and we'll go into the music thing because there's an exhibition about Frankie Goes to Hollywood and they were our youth really (P4).*

Sometimes, participants gave precedence to socializing while engaging in arts and cultural activity, so that the experience of arts and culture itself was not the main priority:

*That one I didn't enjoy, I didn't necessarily enjoy the show. What I enjoyed was the experience of being out with friends again (P8).*

Participants highlighted the emotional aspect of being together again, as well as seeing other people enjoying arts and culture:

*It was really lovely to see people back on the streets, enjoying arts and culture again, that gave me a buzz. . . It just felt a bit*

*of normal again, as well, seeing people kind of experiencing different things (P7).*

Some participants noted that socializing with people face-to-face has been a highlight of returning to in-person provision:

*I think being with people topped the lot (P3).*

As in the earlier interviews (Chapple et al., under review), participants affirmed that engaging in arts and culture during the pandemic helped them feel connected to others:

*We had a sort of joint Zoom of the choir with another choir. So that was really, that was a lot of fun. And it helped us I think, to feel connected, you know, because it was with other people doing singing, like we do. We were really pleased to be able to get in touch with them in that way (P3).*

Resuming in-person events was also an opportunity for some to meet new people and make new connections with others while enjoying arts and culture together in a shared space. This is an experience that many reported to be difficult to replicate online:

*Sometimes when you are just in a place and you start chatting to somebody about stuff, you know? [ . . . ] And it's just nice to have a connection with somebody (P4).*

As the restrictions were lifted in July 2021, new opportunities emerged to resume in-person events without social distancing measures. This gave the participants an opportunity to be physically closer to other members of the audience. Some participants reported that this allowed them to feel more "normal," closer to the usual pre-pandemic experience of a live event:

*And because they were in big tents and chairs were close together and stuff, that did feel like a proper night out, that did feel more of an event, of an atmosphere of everybody being in you know, sort of all there together. There was no distance in between the chairs or anything like that. It was literally you were all just sitting together. And that was really nice, and more what you would expect (P4).*

While some enjoyed the increased feeling of togetherness facilitated by being in a shared space together, many reported that social distancing measures and larger better-ventilated spaces were preferable because of safety concerns. While the participants missed mass events, not all of them would have felt comfortable at more crowded events at this time point. Among other concerns, this participant reported some feeling of awkwardness because of being in isolation for so long:

*That idea of like, you've gone so long without interaction (P8).*

## Reframing cultural identity: Local and global identity blurred

As participants returned to in-person events, they continued to express strong appreciation for local culture, particularly for the cultural scene in the LCR:

*We are blessed, because we've got a pretty good cultural offer in the Liverpool City Region. I know it's mainly based around the Liverpool city centre, but there is stuff in the Wirral, I live across the water. There's so much on the doorstep, it is great. And it's dead easy to access, and it's really important (P1).*

As participants stated, the pandemic made them appreciate arts and culture even more, making them more aware of the opportunities that they used to take for granted:

*In the past, if they've not been local or they've not been in a place where I've been staying, I might have just let them pass me by unless I really desperately wanted to see them. Now I just think I'm lucky, I haven't lost my income, you know I'm still working, I can afford it financially. [...] So this is my break now, this is the thing for me to do (P4).*

Some noted that the pandemic had made the vulnerable position of many arts and cultural institutions more visible, and participants were now more aware of the need to support local venues:

*I just think you've got to do things now. You know you don't know how long things are going to be around and if you don't support things, they might close down (P4).*

Along with supporting local institutions, some participants shared that they were happy to travel for arts and culture after the easing of restrictions as a way of catching up on the opportunities missed during the pandemic:

*When I went to Coventry, I saw three shows, because it was a city of culture this year, and I've got to go and support it. [...] Because of the pandemic, I sort of made a commitment to myself that you've got to you know, you've got to do things when you can and take advantage (P4).*

Many reported that the pandemic had in a way blurred the divide between the local and the global arts and cultural providers, offering new opportunities to create connections with likeminded people globally, as well as providing access to content worldwide:

*I'm sure there'll be things that will happen through FaceTime and Zoom and whatever. They will continue because it gave access to people. I mean, gave you access to people from all*

*over the world that you never would have had. So that's brilliant.*

< ... >

*I thought it was really lovely to be working collaboratively with another choir, even though there were just three of them. It was just fabulous to be connected with another group. Such a group as well. So we're hoping that in future, because we all enjoyed it, we hope in the future, we might be able to collaborate more on future things (P6).*

## Re-adjusting to in-person provision

### Varied experiences of in-person events after restrictions lifted

Due to many factors, the return to in-person events proved a challenging, even if exciting adjustment for the audience. For some, this experience highlighted how different life was during the pandemic, resulting in them almost “forgetting” how to engage in live events. Others felt so accustomed to online provision that it felt strange to be back:

*I think because all our rehearsing in the pandemic has been on Zoom, so we've been accustomed to only hearing our own voice and the voice of the musical director (P3).*

For most, however, the ability to attend events in-person was a positive change. Many participants expressed a feeling of elation and excitement related to their first live events after the easing of restrictions:

*Although it was very empty, I think that was the first show I went to with the theatres reopening. And that just felt like this is the start of something. And it was like, yeah, I'm taking my mom out and we are going somewhere. That affected me a bit more in a sort of feeling a bit weepy because you sort of think, this is what we used to take for granted (P4).*

Since the interviews took place after the 19th of July and covered the previous 3 months, the participants provided a rich account of their experiences during the transitional period when varying levels of restriction were still in place. Reported differences in experience of arts and cultural activity, when compared with pre-pandemic times, most often included shorter performances, limited facilities (bars and buffets were closed, so that participants could not stay for a drink afterward), needing to book a timed ticket (for art galleries), social distancing measures, mask-wearing requirements, and COVID-testing. These measures were mostly mentioned in a pragmatic way. Participants described them as a “needs must” and a

minor factor in their overall experience. As the interviews progressed, however, it became clear that for some, their experience had been, in fact, negatively affected by these venue-related restrictions. The key factor that made a difference was the limited audience numbers which resulted in the event feeling less collective:

*I think the venues did a decent job. But it's not... It's not as exciting, as immediate as when you've got a lot more people there (P1).*

At the same time, some saw this as a positive aspect, creating the intimate atmosphere experienced at smaller venues with restricted audience numbers:

*The chairs were laid out, you know, in like, little groups, but there were more people there because it's smaller, it was more of a cosier feeling anyway (P1).*

Some participants reported that the restrictions improved their experiences of in-person events in other ways. In particular, the requirement of a timed ticket in art galleries allowed for a more relaxing and less busy experience, avoiding queues and crowds:

*In some ways, it's been nicer. Like the thing about booking to go to galleries and stuff, which you have to do now, is actually sometimes it works out better, because you know, there's not going to be great big queues in front of something, or you're not going to be waiting for ages. And so in some ways that's nicer because you can plan things a little bit better (P4).*

Another positive aspect of the restrictions and, specifically, social distancing, was the enhanced quality of the activity because those engaged had to focus more and listen to each other. Here, one participant talks about attending a socially distanced choir rehearsal on a roof of a building:

*When we did the recordings on the rooftop, the quality of the singing, actually, okay, it was a smaller group, but the quality of the singing was better because people had to listen more to each other because they were distanced (P6).*

This participant also talks about a musical performance at the Liverpool Philharmonic and notes that the experience was more focused and allowed for fewer distractions:

*I also felt that in the Phil[harmonic], I know that it would have been difficult for the musicians initially, they have had to choose some of the repertoire, placed themselves in a different way than they were used to. But I wonder actually whether... I didn't feel that the musical experience was lessened. In fact,*

*I think it may well have been enhanced, because there's a certain element where you have just got to really, really, really be so concentrated in the zone (P6).*

## Managing change during the transitional period

The focus of this subtheme is the macro and external changes affecting audiences' experiences, including alterations to restrictions, the fluctuating number of COVID cases, and the changing of the seasons. At the time of the interviews, many participants felt optimistic and hopeful about the future and were actively planning new events to attend in autumn and later in 2022:

*I couldn't tell you exactly, but probably, even until the end of the year, I've got something like about twenty different events. More so music, and some theatre. Twenty in total. Because when I get going, you know, I could probably go to a gig every week. And 2022 is looking even more promising (P1).*

The overarching feeling expressed, however, was that of uncertainty. It is clear that participants continued to feel unsure about the pandemic and the possibility of lockdowns in the future:

*We can't, I mean, I guess we can't know, between now and September, in September, if the regulations alter again, everything's uncertain (P3).*

Interestingly, some participants reported feeling more cautious at this point (in July 2021) than in the previous interviews in April 2021 (Chapple et al., under review):

*At the moment, definitely [continue to be cautious]. Much more so than I was a couple of months ago. A couple of months ago, yeah, I was going on the bus with a mask on, and I felt comfortable doing that. But I just don't think there is a point at the moment until it's clearer which way things are going (P2).*

It is also interesting to note how the notion of "normality" was discussed in the interviews. Some participants, for instance, mentioned being happy to "feel normal" again when attending in-person events:

*So yeah, it's been nice sort of to start getting a bit closer to normal things in this sort of transition space (P6).*

Others, however, rejected the term "normal" altogether, commenting that it will probably not be possible to "go back to normal" for a long time now:



*I don't think normal is the right term, actually, I don't agree with people, saying we'll go back to normal. It's going to be, it's just different. So hopefully, we can find joy in that different way of living (P8).*

### Taking risks: Varying levels of safety

One of the most prominent subthemes that dominated many of the interviews was the risk-balancing inevitably associated with resuming in-person events. Risk assessment became an important part of returning to in-person events. At this time point (i.e., post 19 July), participants continued to talk about attending live indoor events as a risk:

*So, if you're going to a big event, you think okay, well, essentially, I'll take the risk, because this still feels like it's a risk (P5).*

Other than the direct risk to their health and wellbeing, participants mentioned the risk of being absent from work and, as a result, struggling financially:

*Because there's also work on top of that, it's quite high pressured at the moment. And I don't think it could withstand me being off for any period of time, from being what I would say, is being a little irresponsible really (P8).*

Another important factor considered by participants was how they would reach the venue. Many reported, in particular, that using public modes of travel was a stressful experience that they would prefer to avoid:

*However, more of an issue is getting there because normally I had to travel on public transport. And I don't feel that comfortable being on public transport right now (P2).*

Taking into consideration all of the potential risks and concerns mentioned above, it is understandable that the return to in-person engagement was cautious and gradual. Some participants reported not feeling ready to return yet. Even those who had returned to in-person engagement, expressed wariness. One participant described a recent experience of going to the cinema and going for a coffee before and after the screening:

*And we met for a coffee in an outside cafe beforehand. And then we had coffee afterwards outside again. And I did notice that I enjoyed the second coffee much more than I enjoyed the first coffee. Because the first coffee I was... It was just a bit of kind of butterflies in my tummy. I suppose it was low-grade anxiety (P5).*

Looking forward, however, some participants felt optimistic and hopeful about returning to pre-pandemic levels of

engagement, again describing the gradual transition to in-person events as a learning curve:

*But I do think that we'll learn a bit more about how confident we're feeling about going out and stuff. As the months go past, so maybe hopefully next year, I'll start looking for things to go see again (P5).*

It is important to note that those who returned to events in-person before the 19th July with some restrictions in place, did feel safe at the events they attended:

*Of course, I felt quite comfortable there because it's a big space. Because it was all distanced. [...] So there was plenty of room there (P6).*

The findings suggest that the patterns of engagement might change long-term and have implications for arts and culture organizations in the future. Specifically, many mentioned that, at least at this time point, some level of restrictions was preferable to no restrictions at all:

*Last Monday the restrictions were lifted. And funnily enough, although I really enjoyed being in the theatre, at the same time, I didn't feel quite as safe. You know, because there wasn't any space in between the seats (P3).*

*Actually, given that, obviously, things are still ongoing. And COVID cases are quite high. They actually made me feel more comfortable. So much so that I don't know that I would do the same now, since restrictions have lifted (P8).*

Important measures that made the audience feel safer included social distancing, good air ventilation, and mandatory mask-wearing. Another factor was familiarity with the venue:

*And it felt safe, you know, I think because we used to go to Philharmonic fairly often, we might go six times in a season or something. So, we feel familiar with the surroundings (P3).*

*My brother went and I saw a picture of the auditorium and noticed that it was really spaced out. People had their masks on. The organisation as well was following correct procedures. And they took temperatures on the way in and things like that (P7).*

Many participants emphasized the importance of trusting the organization to ensure COVID-safety at the events they were attending:

*You go to organisations that you feel like you trust to follow guidelines to keep you safe (P7).*

Some also highlighted the importance of clear communication about the measures taken to instill a feeling of safety:

*I think the thing was that they had made very, very clear in the material around the concert, all the things that they were doing to keep people safe. And we knew what to expect, even though it felt sort of unusual compared to you know, what you might do normally, we were ready for it. And I think that was really helpful. So it didn't feel like you were doing something strange in that space, it felt more like you were moving towards doing something closer to normal, because you're able to be there (P6).*

Some suggested, looking ahead, that some measures taken by arts and cultural providers in response to COVID-19 might need to remain in place:

*Certain things are going to have to sort of change permanently. I imagine certain venues will need better ventilation or need better seating arrangements, and that kind of thing, really (P8).*

## Moving forward: Online and blended provision

### Ongoing considerations around online inclusion

As discussed earlier, the return of the audience to in-person provision was gradual and cautious. It is evident in that case, that online or hybrid arts and cultural provision continued to be a vital option for many. At the same time, there were numerous concerns around the accessibility of, and some barriers to, online provision that continued to impact audiences' experiences. In accordance with findings from previous waves of this study (Chapple et al., under review), participants preferred in-person provision to online if they had a choice. In particular, many noted that the social aspect of engaging in arts and culture was preferable and more enjoyable in person:

*I think when you're face to face, you can tell when somebody is going to talk. And it just feels a lot more. . . Because we are used to it. So, it sounds a lot more comfortable being face to face and talking, sharing ideas. [ . . . ] Yes, it felt much nicer, much, much nicer than doing on Zoom (P5).*

Other practical barriers highlighted by participants included technical issues, cost, and difference in time zones. Similar to

the interviews conducted with representatives from arts and cultural organizations within the LCR (Worsley et al., 2022), screen fatigue was among the factors cited as a barrier to online engagement:

*I'm online all day at work, all my meetings are online. Yeah, I'm by the tiny laptop screen all day, every day in the office. So yeah, that's not necessarily something that I want to be doing more of outside of work (P2).*

In addition to these barriers to online engagement, some participants were keen to resume missed opportunities in-person as soon as it became possible. Summer season, better weather and longer days were decisive factors in favor of opting for in-person engagement:

*Now, at the moment, I just want to spend Summer doing things, going to things and trying things again (P4).*

Another common barrier to online engagement was the difficulty of connecting with others online. For instance, a participant talked about a recent experience of a Zoom workshop that was intended as a platform for different generations to come together. The participant, however, struggled because the younger participants refused to turn their cameras on:

*So, the intention was to bridge generations. And actually, it didn't do that initially. Well, it didn't do that, in some ways to me at all. Because I found it really hard to build a relationship with someone that I couldn't see, and that never spoke (P6).*

The difficulty of connecting to others online was also mentioned by this theater practitioner who staged an online streamed theater production during lockdown:

*I've kind of almost distanced myself from that emotional experience. And it, it did feel a little bit like the whole event ended a little bit abruptly. There was no taking a bow or having a chat in the bar. It just felt a little bit of a let-down. And that was really hard (P7).*

The same participant, however, reported that having audience members respond by sending feedback (despite the time delay) made the experience more valuable. The participant added that, in a way, online feedback seemed more sincere than the immediate reactions they would usually get during a live performance:

*So, when I started getting messages to say the people have enjoyed it, and it has resonated with them, I found it quite emotional.*

< . . . >

*And then it felt a little bit more sincere. Because I think when you're at a show, everyone says it is great, that's great. But then to put that down in a message and explain why it felt like it had a bit of sincerity to it (P7).*

Finally, this subtheme also captures some new concerns around inclusion and exclusion, relating to accessibility for vulnerable people. When restrictions were lifted, online provision retained its importance, and vulnerable people continued to benefit from these hybrid opportunities.

Some participants also expressed concerns for vulnerable friends and family and awareness of putting them at risk when attending in-person events. An important aspect pointed out by participants was the responsibility associated with potentially putting others at risk when planning an event:

*Everything you do at the moment is about is what you're doing worth the risk? And everything that somebody else suggests, it's worth the risk, because somebody else's suggested it and I want to be with them. But I am not quite ready myself to suggest that somebody else takes the risk with me if you see what I mean (P6).*

The importance of maintaining online and hybrid provision to ensure inclusivity, particularly in the colder months of the winter when the opportunity for outdoor events will be limited, was highlighted:

*And, you know, whatever happens in September, we're ready to go inside again, in a bigger space, but it may well be that some of those people still feel vulnerable. So we might find ourselves continuing to do some alternatives on Zoom. I don't know, we have to see how it goes. But what we don't want to do is to exclude anybody, because they feel uncomfortable (P6).*

## Navigating online content

This subtheme captures the changing experiences of arts and cultural engagement online and some practical issues with respect to online provision. One important aspect revealed in the interviews was the selective and more functional approach to hybrid provision among participants. In particular, they tended to use online resources to seek information about arts and cultural events. Specifically, participants preferred social media for these purposes, which might be an incentive for arts and cultural organizations to use their social media platforms more:

*Well, I did use some websites of institutions, some of them are good. But more and more I go to social media for information, so you know, on Facebook, you know, I'm more likely to see a link to whatever and then just go to websites, instead of going straight to the website and find where the thing is (P1).*

Online provision was regarded as preferable for professional development;

*Yes, sometimes I do actually [prefer online workshops to in-person], because it's just a bit more convenient. And I think the only thing I want from these workshops is kind of information? It's not like I'm going for the social experience or anything (P7).*

Whilst some arts and cultural activities were also regarded as more suited to online provision, others appeared more difficult to replicate online:

*So, the theatrical productions are good to watch online, but it can't beat the experience of going to watch actors in the theatre. Cinema... I could take it or leave it. It's easier watching it at home. Art, I would rather go to an art gallery to appreciate it, rather than looking at it online. So, I think online is good, in some ways. It's filled a gap. But it's only a small piece of it (P1).*

As these comments suggest, preference for online or in-person delivery varied by activity, and the selection of mode was dependent on individual preference. This participant, for example, argued that online provision might be less suitable for live music concerts:

*There is obviously a social aspect to going to a gig. So yeah, very different in that respect (P2).*

## Discussion

This study aimed to explore the changing experiences of in-person engagement in arts and culture after the lifting of the COVID-19 restrictions in July 2021 in the LCR. The findings suggest that the day the restrictions lifted was not a clear-cut return to "normality" for the participants. Instead, this change was the start of a new period of transition forging a "new normal" where the pandemic and pre-pandemic experiences were combined. Interestingly, the whole idea of "normality" has been transformed, and while some were eager to return back to "normal," others rejected the idea altogether, arguing that the "norm" itself has changed during the pandemic. This, in turn, has opened up questions about the long-term effects of the pandemic on the arts and culture industry and the audience's patterns of engagement in arts and culture in the months and possibly years to come.

The crucial role of arts and culture for the sense of self for the participants was highlighted. On resuming in-person engagement after a long break, participants noted that they were finally able to start rebuilding their sense of self previously

negatively impacted by the pandemic. Our findings also demonstrate that arts and culture maintain their importance for personal development and growth. Engaging in arts and culture helped participants to cope with the stresses of this transitional period and such engagement became an important source of resilience. Attending arts and culture venues also helped the participants gradually rebuild the confidence to engage in other activities in person.

While the importance of social connectedness and a sense of belonging through arts and culture remains strong, several risk concerns surfaced in the interviews. Compared to our findings at waves (i) and (ii) (Chapple et al., under review), participants expressed increased anxieties, in the most recent period covered by the study, related to putting their friends and family at risk when attending in-person events.

The impact of the pandemic was also evident in the reframed cultural identity reported by some participants. The increased availability of online provision has in some ways blended the lines between local and global arts and culture. While participants reported a renewed appreciation and desire to support local arts and culture institutions, they were also exposed to a wider global variety of arts and culture, which broadened their horizons.

Undoubtedly, patterns of in-person engagement in arts and culture changed significantly during the pandemic. In line with recent research (e.g., [The Audience Agency, 2021](#)), our findings show that the return to in-person events proved to be slow and cautious. This transitional period was widely affected by risk-balancing directly linked to the safety measures taken by organizations. Some participants highlighted the importance of trusting the arts providers and being familiar with the measures taken in order to feel more confident when returning to in-person events.

While some reported that their experiences became more limited, many noted that the experience of arts and culture was actually enhanced by the COVID-19 restrictions, making it easier to focus on the art and easier to avoid distractions. Social distancing and timed entries also positively affected the cultural experience for some.

The findings suggest that online provision remains vital for many, ensuring wider inclusivity, particularly for vulnerable audiences. Since many still viewed attending in-person events as a risk, participants appreciated the option of alternative provision as the pandemic continued to unfold. At the same time, it is important to acknowledge the potential barriers to online inclusion and the possibility of a growing digital divide. Some participants mentioned the cost and accessibility of online provision coupled with screen fatigue as barriers to online engagement in arts and culture. Online provision, these findings suggest, may also struggle to replicate the feeling of connectedness experienced during in-person live events.

For arts organizations, moving forward, it will be important to gather the audience's feedback as the patterns of engagement

in arts and culture continue to change as a result of the pandemic, and to consider the channels of communication used to connect to potential target audiences. For example, attention to the clarity of communication on safety measures, setting out clear rules and ensuring that audiences are familiar with them, will mitigate some of the anxieties that audiences feel when they balance risks in relation to returning to in-person events. On the other hand, while audiences are keen to support local arts and culture, a renewed interest in traveling for arts might open up new opportunities to reach wider groups of beneficiaries.

Finally, it is crucial to note that, despite some limitations, digital provision addressed some of the audience's risk and safety concerns in this transitional period and beyond. Based on the beneficiaries' responses, online experience could be enhanced by further prioritizing and encouraging social interaction, putting additional effort into facilitating discussions and encouraging input from all participants.

There are several limitations to this study that should be considered. First, this study includes a relatively small sample of participants and the time period it covers does not go beyond August 2021. In the future, it would be important to look at the changes in subsequent months in order to evaluate any long-standing effects of the pandemic on the audience's experience. Second, this study is geographically limited to the LCR. It would be useful to explore patterns of engagement in different regions of England and beyond in order to get a sense of arts and cultural engagement at national level. Third, it might be useful to look specifically at the experiences of vulnerable people in the LCR. Finally, it would be useful to dedicate future research to identifying in more detail the preferences toward online and offline provision for specific types of arts and culture events.

To conclude, this study has highlighted the benefits of engaging in arts and culture during the COVID-19 pandemic. As the findings suggest, the role of arts and culture remains crucial in supporting mental health and wellbeing in the LCR. The findings support previous research showing that engagement in arts and culture during challenging and transitional times can help reduce stress and increase the ability to cope with traumatic experiences. Importantly, the study shows that engagement in arts and culture was beneficial not only during full lockdown (Chapple et al., under review) but also during the more recent transitional period of return to in-person engagement. This might suggest that engagement in arts and culture will continue to be crucial in the immediate future and beyond, possibly becoming one of the vital tools of processing the collective trauma of 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 University of Liverpool Research Ethics Committee (reference: 7994). The patients/participants provided their written informed consent to participate in this study.

## Author contributions

JB and EB conceived the study. AA collected the qualitative data, analyzed the qualitative data to finalize the framework for wave 3, in consultation with the research team, and wrote the first draft of the manuscript. AA and MC coded a subset of transcripts. MW and MC analyzed wave 1 and 2 data and created a working thematic framework that informed the wave 3 framework. JB, EB, JW, and MW read, commented on, and revised the manuscript providing important intellectual input. All authors have read and approved the final 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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## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.1011766/full#supplementary-material>



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