

Psychological status of medical workers throughout the COVID-19 pandemic and beyond: Mental health emergence, prevalence and interventions

Edited by

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Published in

Frontiers in Public Health

Frontiers in Psychiatry



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ISSN 1664-8714
ISBN 978-2-83252-136-6
DOI 10.3389/978-2-83252-136-6

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Psychological status of medical workers throughout the COVID-19 pandemic and beyond: Mental health emergence, prevalence and interventions

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Citation

Lam, L. T., Reddy, P., eds. (2023). *Psychological status of medical workers throughout the COVID-19 pandemic and beyond: Mental health emergence, prevalence and interventions*. Lausanne: Frontiers Media SA.
doi: 10.3389/978-2-83252-136-6

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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

RECEIVED 15 March 2023

ACCEPTED 17 March 2023

PUBLISHED 27 March 2023

CITATION

Lam LT and Reddy P (2023) Editorial:
Psychological status of medical workers
throughout the COVID-19 pandemic and
beyond: Mental health emergence, prevalence
and interventions.
Front. Public Health 11:1186807.
doi: 10.3389/fpubh.2023.1186807

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Editorial: Psychological status of medical workers throughout the COVID-19 pandemic and beyond: Mental health emergence, prevalence and interventions

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KEYWORDS

COVID-19, mental health, healthcare worker, epidemiology, intervention

Editorial on the Research Topic

[Psychological status of medical workers throughout the COVID-19 pandemic and beyond: Mental health emergence, prevalence and interventions](#)

COVID-19, the first documented coronavirus pandemic in history has been considered a human catastrophe unseen in the past century (1). The impact of the pandemic is tremendous, in terms of mortalities, long-term morbidities, and the global economy. The World Health Organisation (WHO) has estimated that COVID-19 pandemic-related deaths, recognized as “excess deaths,” to be 14.9 million (95% C.I. =13.3–16.6 million) in 2020 and 2021 (2). Excess deaths refer to the difference between the number of deaths that have occurred and the expected number of deaths, based on previous data, in the absence of the pandemic (2). In terms of the impact of the COVID-19 pandemic on the global economy, it has been recognized by the World Bank that the largest worldwide economic crisis in more than a century has been triggered (3). Based on the available data since the onset of the pandemic, the World Bank notes that many governments have made decisive economic policy responses that are successful in mitigating the impact of the pandemic on the national and international economic crisis in the short term (3). However, these immediate and drastic responses of economic reliving packages would have longer-term consequences in creating more debts, particularly among countries of emerging economies. This will, in turn, create significant global inequality and poverty within and across many countries (3). Such phenomena have been demonstrated in many studies on loss of income and unemployment during the pandemic (4).

The pandemic has had a direct impact on the physical aspects of health, and impinges on the mental health, of our worldwide population. As people are exposed to traumatic events, frontline medical and health professionals have been the group that crops the hardest hit (5). It has long been recognized that frontline healthcare workers, including medical, nursing, and allied health professionals, are at high risk of mental health problems due to frequent exposure to traumatic events (6). However, the scenario of a worldwide pandemic and its impact on the healthcare system is unprecedented. The psychological and mental health

sequelae of healthcare workers to such a global catastrophe, which has never been seen and experienced in the current generation before, warrant thorough documentation. The effort and wisdom of various intervention programs put in place by different jurisdictions to assist frontline workers in mitigating and alleviating the burden of psychological and emotional trauma are certainly worth noting and reporting.

This Research Topic aims to report the work of a group of researchers who have been investigating the issue of the psychological status and mental health problems of healthcare workers during the pandemic from diverse disciplinary and methodological backgrounds.

This series consists of 16 articles of different study designs reporting on the different ways the pandemic impinged the mental health of frontline healthcare workers, including medical, nursing, and allied health professionals. Of these, ten were cross-sectional surveys using self-reported questionnaires (El Sharif et al.; Li et al.; Liu et al.; Mei et al.; Ning et al.; Peng J. et al.; Peng P. et al.; Pahrol et al.; de Vroeghe and van den Broek; Zhao et al.). Four studies employed a qualitative approach with semi-structured interviews with participants (Alsaeed et al.; Ding et al.; Mediavilla et al.; Tan Cheung et al.). Banse et al. reported a case study and Xu et al. followed a cohort of hospital staff who had been involved in the Employee Assistance Program (EAP).

For geographical distribution of these studies, since the first outbreak of the COVID-19 pandemic occurred in China, it is not surprising to find that more than half of these studies were conducted in China, including Hong Kong the Special Administrative Region (Ding et al.; Li et al.; Liu et al.; Mei et al.; Ning et al.; Peng P. et al.; Tan Cheung et al.; Xu et al.; Zhao et al.). Four studies were conducted in Europe, including the UK (Peng J. et al.), the Netherlands (de Vroeghe and van den Broek), Belgium (Banse et al.), and Spain (Mediavilla et al.). Two reported findings are from the Middle East with one from Palestine (El Sharif et al.) and a recent one from Kuwait (Alsaeed et al.). Pahrol et al. investigated the topic in Malaysia.

To explore the emerging mental health problems among frontline healthcare workers, a few qualitative studies explored the issue with medical and nursing staff mainly in the hospitals where they were exposed to patients with greater severity. Tan Cheung et al. found that interviewed nurses were intensely fearful, worried, and anxious. They were worn out, and distressed with their psychosocial and physical health greatly impacted. They were also found to have limited ways of coping with distress. In the Spanish study by Mediavilla et al., it was found that healthcare workers were psychologically and morally distressed. Moreover, the mental health strategies implemented in the hospital did not fully address the needs of healthcare workers.

In terms of the prevalence of mental health problems exhibited during the pandemic period between early 2020 and the end of 2022, various studies provided slightly different estimates. Mei et al. reported that nearly 11% of frontline medical staff had exhibited PTSD symptoms during the first outbreak of COVID in Wuhan. It was also found that insomnia mediated the association between stress and PTSD and compassion moderated the relationship. On the other hand, de Vroeghe and van den Broek found that about 50% of respondents had experienced stress, anxiety, anger, and sadness

with 4% of healthcare workers of mental healthcare institutions considered resigning. Another survey in China by Ning et al. revealed that nearly 24% of the medical and nursing staff involved in the study had symptoms of depression, 27% anxiety, and 16% stress. Moreover, medical staff has a higher rate of depression and anxiety than nurses. Pahrol et al. studied healthcare workers in Malaysia and found that about 19% of respondents showed symptoms of PTSD, however, the majority (92%) perceived the outbreak has a low impact on their life and work.

Some risk and protective factors were identified in these studies. For example, the study by Li et al. among dentists in China found that various situational variables, such as the impact of COVID on daily life and work, exposure to the virus, and lack of awareness of the preventive and control measures, were associated with mental health problems. Ning et al. also identified that the perceived risk of exposure was associated with both depression and anxiety. The UK study by Peng J et al. discovered that married women had lower mental well-being than married men and the well-being of single women was significantly lower than that of married women and men. On the other hand, environmental and organizational factors would be protective of healthcare workers' mental health. El Sharif et al.'s study in Palestine found that better mental health was associated with confidence in the system's ability to manage the pandemic. Furthermore, training in IPC procedures and sufficient provision of PPE increased the trust of staff.

For the intervention and prevention of mental health problems among healthcare workers during and beyond the pandemic period, some information and examples have been provided from a few studies. In the study by Alsaeed et al. among Keratinase healthcare workers, three main themes emerged on the readiness of healthcare workers for future crises. These included the enhancement of self-resilience, a better-equipped workforce and healthcare environment, mitigation of stigma, and increased public awareness of preventive measures. Banse et al. also showcased a multiple-approach intervention program implemented in a Belgium hospital to support workers during COVID and the process of reinforcing the impact of the program in preparation for future similar crises. Xu et al. reported the results of an intervention program using the EAP as a means to provide support to hospital staff. Results indicated significant reductions in mental health problems, including depression and anxiety, among staff after they completed the EPA program.

We hope this series of articles can draw attention to the issue of mental health and mental well-being of all personnel, particularly frontline healthcare workers, after being exposed to traumatic events and global health crises, such as the COVID-19 pandemic. The experience of these trauma exposures could be long-lasting and affected individuals may require lengthy rehabilitation. More thorough research into effective preventive intervention strategies is needed to enhance the readiness and preparedness of all walks of life to face up the challenges of similar global crises in the future.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Acknowledgments

I would like to acknowledge the contributions of the authors of these interesting and important articles. Without their efforts, this Research Topic will not be successful. I would also like to express my gratitude for the support of PR whose assistance is invaluable.

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References

1. Liu YC, Kuo RL, Shih SR. COVID-19: the first documented coronavirus pandemic in history. *Biomed J.* (2020) 43:328–33. doi: 10.1016/j.bj.2020.04.007
2. WHO. *14.9 Million Excess Deaths Were Associated the COVID-19 Pandemic in 2022 and 2021.* (2022). Available online at: <https://www.who.int/news/item/05-05-2022-14.9-million-excess-deaths-were-associated-with-the-covid-19-pandemic-in-2020-and-2021> (accessed March 12, 2023).
3. World Bank. *World Development Report 2022: Finance for an Equitable Recovery.* Washington, DC: World Bank (2022).
4. Dang HH, Viet Nguyen C. Gender inequality during the COVID-19 pandemic: income, expenditure, savings, and job loss. *World Dev.* (2021) 140:105296. doi: 10.1016/j.worlddev.2020.105296
5. D'Ettorre G, Pellicani V, Ceccarelli G. Post-traumatic stress disorder symptoms in healthcare workers: a ten-year systematic review. *Acta Biomed.* (2020) 91:e2020009. doi: 10.23750/abm.v91i12-S.9459
6. Lam LT, Ross FI, Cass DT, Quine S, Lazarus R. The impact of work-related trauma on the psychological health of nursing staff: a cross-sectional study. *Aust J Adv Nurs.* (1999) 16:14–20.



Prevalence and Related Factors of Depression, Anxiety, Acute Stress, and Insomnia Symptoms Among Medical Staffs Experiencing the Second Wave of COVID-19 Pandemic in Xinjiang, China

OPEN ACCESS

Edited by:

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Reviewed by:

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Specialty section:

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

Received: 24 February 2021

Accepted: 07 April 2021

Published: 17 May 2021

Citation:

Zhao Y, Guo J, Liu S, Aizezi M,
Zeng Q, Sidike A, Abliz R, Kudireti A,
Xie Y, Taineikuli A and Zhang B (2021)
Prevalence and Related Factors of
Depression, Anxiety, Acute Stress,
and Insomnia Symptoms Among
Medical Staffs Experiencing the
Second Wave of COVID-19 Pandemic
in Xinjiang, China.
Front. Public Health 9:671400.
doi: 10.3389/fpubh.2021.671400

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The prevalence and related factors of mental health impact among medical staffs who experienced the second wave of the COVID-19 pandemic in China is unknown. Therefore, this survey was conducted to investigate the prevalence and related factors of depressive, anxiety, acute stress, and insomnia symptoms in medical staffs in Kashi, Xinjiang, China during the second wave of the COVID-19 pandemic. A cross-sectional online survey was conducted among medical staffs working in First People's Hospital of Kashi, Xinjiang. The questionnaire collected demographic data and self-design questions related to the COVID-19 pandemic. The Impact of Events Scale-6, the Insomnia Severity Index, the Patient Health Questionnaire-9, the Generalized Anxiety Disorder Scale-7, the Perceived Social Support Scale, the Chinese Big Five Personality Inventory-15, and the Trait Coping Style Questionnaire were used to measure psychological symptoms or characteristics. Binary logistic regression was carried out to examine the associations between socio-demographic factors and symptoms of depression, anxiety, stress, and insomnia. In total, data from 123 participants were finally included, among which the prevalence rate of depressive, anxiety, acute stress, and insomnia symptoms is 60.2, 49.6, 43.1, and 41.1%, respectively. The regression model revealed that minority ethnicity, being worried about infection, spending more time on following pandemic information, and neurotic personality were positively associated with the mental health symptoms, while extraversion personality, higher education level, and better social support were negatively associated. In our study, the prevalence of mental health impact was high among medical staffs in Kashi, China who experienced the second wave of the COVID-19 pandemic. Several factors were found to be associated with mental health

conditions. These findings could help identify medical staffs at risk for mental health problems and be helpful for making precise mental health intervention policies during the resurgence. Our study may pave way for more research into Xinjiang during the COVID-19 pandemic.

Keywords: COVID-19, mental health, medical staff, resurgence, pandemic

INTRODUCTION

The coronavirus disease 2019 (COVID-19), which first broke out in Wuhan, China at the end of 2019 brought about a global public health emergency. On January 23rd, 2020, the first two confirmed cases were reported in Xinjiang, China, and Xinjiang was going through a major public health event (1). Under the effective preventive measures of the Chinese government, the pandemic has gradually been brought under control in Xinjiang, as there has been neither a new confirmed nor new asymptomatic indigenous case in Xinjiang since August 18th, 2020 (2). Furthermore, since August 21st, 2020, neither new confirmed nor new asymptomatic indigenous cases had been reported in the mainland of China (3). The situation had lasted for about 2 months, which was much longer than the 2-week incubation of COVID-19. Therefore, it can be stated that the first wave of the pandemic was ended in the mainland of China. However, the pandemic began to rebound in the mainland of China, starting with Xinjiang where a new indigenous asymptomatic case was reported again on October 24th (4). Since then, there has been a resurgence of the pandemic first in Xinjiang followed by other provinces of China, putting the whole country into another round of major public health event.

Major public health events, such as the outbreak of COVID-19, generate great concern as well as mental health problems among people, especially among medical staffs. A meta-analysis revealed that the COVID-19 pandemic increases the mental health problems of the global population, particularly health care workers (5). Some other studies conducted during the outbreak period also showed the high prevalence of mental health problems such as depression, anxiety, insomnia, and acute stress among medical staffs (6–9).

Several factors are found to be associated with these mental health problems. Medical workers who have direct clinical contact with infected patients, are suspected cases, or work in the worst affected area are found more likely to experience anxiety symptoms (6). Zhang's study suggests that insomnia symptoms are positively associated with low education level, currently working in an isolation unit, worried about being infected, perceiving lack of helpfulness in terms of psychological support from the news or social media concerning COVID-19, and having very strong uncertainty regarding effective disease control (7). Besides, acute stress disorder is found to be associated with psychosomatic symptoms as well as hostility (9). Furthermore, social support, coping style, and personality are also considered to play an important role in the prevalence of mental health problems. A study done during the early outbreak of COVID-19 identifies that levels of social support

for medical staffs are significantly associated with self-efficacy and sleep quality and negatively associated with the degree of anxiety and stress (10). Another study reveals that the positive coping mechanism was negatively correlated with anxiety (8). As for personality, extraversion, agreeableness, conscientiousness, and openness are found negatively correlated with generalized anxiety and depressive symptoms while neuroticism is positively correlated (11).

Although several studies have analyzed the mental health status of medical staffs during major public health events, only a few studies were done in Xinjiang, China (12). Besides, most of the studies were conducted during the outbreak period of COVID-19 rather than the resurgence period, leaving the health status of medical staffs during such a special major public health event still unknown. Moreover, as Xinjiang was the first place where the second wave of the pandemic broke out, the investigation and study done here would be more meaningful and representative. In view of this, we did this survey to investigate depressive, anxiety, acute stress, and insomnia symptoms to explore the related socio-psychological factors among medical staffs who experienced the resurgence of the COVID-19 pandemic in Kashi, China.

METHODS

Study Design and Samples

The cross-sectional survey was conducted online among medical staffs working in the First People's Hospital of Kashi, Xinjiang, China. It was started on November 5th, 2020 and ended on November 12th, 2020, when Kashi was experiencing the second round of the COVID-19 pandemic. Participants who met the following criteria were included: (1) medical staff, (2) could read a Chinese questionnaire, (3) WeChat user, and (4) volunteered for the survey. The exclusion criterion was being unable to understand the questionnaire. Our investigators forwarded the questionnaire to different WeChat groups of medical staffs to recruit participants. Before the survey got started, the purpose and significance of the survey were introduced briefly to all participants, and participants' consent was necessary for further continuation of the survey. Before the final submission, participants could proceed only if all questions in the survey were answered. The data were recorded automatically. People who completed the questionnaire were encouraged to forward the survey to others. This study was approved by the Ethics Committee of Nanfang Hospital, Southern Medical University. To guarantee the participants' privacy, the survey was conducted anonymously.

TABLE 1 | Demographic characteristic of the total sample ($N = 123$).

Factors	Frequency (%)
Gender	
Male	34(27.6)
Female	89(72.4)
Age (Mean \pm SD)	36.98 \pm 7.88
Ethnicity	
Minority	61(49.6)
Han	62(50.4)
Education level	
Bachelor or below	99(80.5)
Master or doctorate	24(19.5)
Staff type	
Doctor	71(57.7)
Nurse	37(30.1)
Others	15(12.2)
Staff title	
None or junior	48(39.0)
Middle	40(32.5)
Sub-senior or senior	35(28.5)
Working department	
Fever outpatient/ Emergency/ Isolation unit/ ICU	19(15.4)
Normal outpatient or inpatient unit	78(63.4)
Others (Medical laboratory/ Pharmacy/ Administrative department etc.)	26(21.1)
Alcohol use	
No	70(56.9)
Yes	53(43.1)
Smoking	
No	102(82.9)
Yes	21(17.1)
Work requires contact with feverish or infected patients	
No	108 (87.8)
Yes	15 (12.2)
Infected with COVID-19	
No	123(100)
People around you infected with COVID-19	
No	116(94.3)
Yes	7(5.7)

SD, standard deviation; ICU, intensive care unit.

Measures

Demographic data were collected at the beginning of the survey. Self-designed questions related to the COVID-19 pandemic, such as infection status and contact with feverish or infected patients, were also recorded.

The Patient Health Questionnaire-9 (PHQ-9) was included to assess depressive symptoms (13), of which the total scores can be categorized into normal (0–4), mild (5–9), moderate (10–14), and severe (15–27) depression. The cutoff score of 5 for PHQ-9 was adopted in this study.

The Generalized Anxiety Disorder Scale-7 (GAD-7) (14) was used to detect anxiety symptoms, with the categorization of the

total score into normal (0–4), mild (5–9), moderate (10–14), and severe (15–21) anxiety. The cutoff score was set as 5 for GAD-7.

The Impact of Event Scale-6 (IES-6) (15) was used to identify acute stress symptoms. The average score “S” of IES-6 is categorized as follows: $S < 1.09$ = normal; $1.09 \leq S < 1.5$ = showing stress symptoms; $S \geq 1.5$ = may be diagnosed with PTSD (16). The cut-off score of 7 (the average score $S \geq 1.09$) was applied in this study.

As for the evaluation of insomnia symptoms, the Insomnia Severity Index (ISI) was administered (17), of which the classifications of the total score were categorized into normal (0–7), mild (8–14), moderate (15–21), and severe (22–28) insomnia. A total score of ≥ 8 is considered to be having symptoms of insomnia.

The Chinese Big Five Personality Inventory-15 (CBF-PI-15), which consists of five independent factors including extraversion (E), agreeableness (A), conscientiousness (C), neuroticism (N; emotional stability), and openness to experience (O), was used to measure personality in this study (18). Scoring higher in each facet implies its positive tendency in that dimension of personality.

The Trait Coping Style Questionnaire (TCSQ) was used to assess our subjects’ coping style (19). TCSQ consists of two sub-scales, of which the higher score in each sub-scale reflects the higher tendency of positive or negative coping style.

The Perceived Social Support Scale (PSSS) was performed to analyze social support (20). The total score ranges from 12 to 84, which can be categorized into 3 different levels: poor (12–36), moderate (37–60), and strong (61–84) social support.

Statistical Analysis

The categorical variables in this study were presented with frequency and percentage while the continuous variables were reported with mean and standard deviation. In univariate analyses, a Chi-square test or *t*-test was used to examine the associations of demographics, pandemic-related, and psychological factors with depressive, anxiety, insomnia, and acute stress symptoms. The factors showed significance in the univariate analyses were included in further binary logistic regression analyses. The regression model was adjusted for gender and age by using the enter method while other demographic, pandemic-related, and psychological factors were analyzed by using the forward likelihood ratio method. All analyses were two-tailed with an alpha level set at $P < 0.05$ and were conducted using SPSS software 22.0.

RESULTS

Demographic Characteristics

Data from 123 participants were obtained and none were excluded prior to data analysis. The average time the participants spent finishing the questionnaire was about 17 min. Of the total sample, 34 participants (27.6%) were male, and the mean (SD) age was 36.98 (7.88) years. Most of the participants had a bachelor’s degree or below ($n = 99$, 80.5%) and were non-smokers ($n = 102$, 82.9%). While 71 participants (57.7%) were doctors, 37 (30.1%) were nurses, and 15 (12.2%) were other medical staffs.

Of the total number of participants, 35 (28.5%) participants had a sub-senior or senior title, 53 (43.1%) consumed alcohol, 19 (15.4%) worked in fever outpatient/ emergency/ isolation unit/ intensive care unit, and 7 (5.7%) had infected people around them. None of the participants ever got infected with COVID-19 (shown in **Table 1**).

Prevalence of Symptoms of Acute Stress, Insomnia, Depression, and Anxiety

The prevalence of the studied mental health symptoms among the total sample was 60.2% for depressive, 49.6% for anxiety, 43.1% for acute stress, and 41.4% for insomnia symptoms, respectively. The prevalence of symptoms of the four mental health conditions was higher among participants who had a bachelor's degree or below, were worried about infection, spent more time on pandemic information, had moderate social support, scored lower in positive coping sub-scale of TCSQ and extraversion sub-scale of CBF-PI-15, and scored higher in neuroticism sub-scale of CBF-PI-15. The symptoms of anxiety, acute stress and insomnia were more prevalent among participants of minority ethnicities. Furthermore, the participants with depressive symptoms were more likely to be female, having none or junior staff title, smoking, and with a high score in the negative coping sub-scale of TCSQ (shown in **Tables 2, 3**).

Regarding the prevalence of the four mental health conditions among different types of medical staffs, the prevalence of depressive symptoms among doctors, nurses, and other medical staffs (including medical laboratory/pharmacy/administrative department etc.) was 56.34, 64.86, and 66.67%, respectively. The prevalence of anxiety symptoms was 50.71, 48.65, and 46.67%, respectively. The prevalence of acute stress symptoms was 42.25, 51.35, and 26.67%, respectively. And the prevalence of insomnia symptoms among doctors, nurses, and other medical staffs was 43.66, 56.76, and 66.67%, respectively.

Factors Associated With Symptoms of Acute Stress, Insomnia, Depression, and Anxiety

The results of binary logistic regression analysis of the related factors of the four mental health conditions are shown in **Table 4**. Scoring higher in the neuroticism sub-scale of CBF-PI-15 was found to indicate a higher risk of the four mental health symptoms (range, adjusted ORs 1.41–1.91). Compared with those who did not worry about infection, participants that showed their worrying had a higher risk of depressive symptoms (adjusted OR, 3.43; 95%CI, 1.38–2.22). As for anxiety symptoms, participants of minority ethnicities were found to have a higher risk than that of Han ethnicity (adjusted OR, 3.06 95%CI, 1.08–8.65). Meanwhile, anxiety symptoms were more likely among those who had moderate or poor social support when compared with those having strong social support (adjusted OR, 4.68; 95%CI, 1.68–13.03). In addition, participants who spent more than 30 min on pandemic information before sleep were more likely to experience acute stress symptoms (adjusted OR, 3.14; 95%CI 1.25–1.88). On the contrary, a lower risk of acute stress

symptoms was associated with a higher score in the extraversion sub-scale of CBF-PI-15 (adjusted OR, 0.78; 95%CI, 0.66–0.91). Moreover, participants with higher education level were also less likely to have insomnia symptoms and anxiety symptoms (range, adjusted ORs 0.19–0.28).

DISCUSSION

In this study, a total of 123 participants were investigated, of which approximately 41.4–60.2% exhibited symptoms of depression, anxiety, acute stress, and insomnia. We identified that minority ethnicity, being worried about the pandemic, spending more time on pandemic information, and neurotic personality were positively associated with the four mental health conditions, while extraversion personality, higher education level, and better social support were negatively associated.

The prevalence of the four mental health symptoms studied in the present study is much higher than previous findings. A previous meta-analysis showed that the pooled prevalence of depression and anxiety among health care workers during the COVID-19 pandemic is 22.8 and 23.2%, respectively (21). Another study, which also used ISI and the same cut-off score as this study to detect insomnia symptoms among medical staffs, presented a prevalence of 36.1% for insomnia symptoms (7). Meanwhile, Wang's study found that the prevalence of acute stress disorder symptoms is 38.3% among frontline health professionals, but used a different questionnaire than this study to measure acute stress reaction (9). The higher prevalence of mental health symptoms in our study could be due to the resurgence of the COVID-19 pandemic. While the first round of the pandemic was generally controlled in most parts of mainland China, Xinjiang, especially Kashi City, was undergoing the second round of COVID-19 pandemic in advance. The existence of the COVID-19 pandemic arouses people's fear, worry and uncertainty about infection. Taha's study demonstrates that individuals with a high intolerance of uncertainty are more likely to perceive the pandemic as threatening, predicting elevated levels of anxiety (22). An analysis done by Bakioglu also indicates a positive relationship between fear of COVID-19 and intolerance of uncertainty, depression, anxiety, and stress (23). In addition, a structural equation modeling reveals that intolerance of uncertainty is strongly associated with anxiety sensitivity, in turn influencing both insomnia severity and sleep quality via depression and anxiety (24). From these, we could infer that the resurgence of the COVID-19 pandemic leads to worry, fear, and uncertainty among medical staffs. Although the successful experience of fighting against the first COVID-19 pandemic may also help in dealing with the second wave of the pandemic, the resurgence increases the uncertainty of whether the pandemic could be brought under control or not, resulting in a higher prevalence of mental health conditions. Another reason for the higher prevalence may be the imbalanced medical conditions in different regions of China. As Kashi is located in the northwest of China, it lags behind other Chinese eastern regions in terms of economy and medical resources. Worse, the first outbreak and second wave of COVID-19 pandemic burdened the medical

TABLE 2 | Prevalence of symptoms of acute stress, insomnia, depression, and anxiety stratified by demographic factors.

	Depressive symptoms			Anxiety symptoms			Acute Stress symptoms			Insomnia symptoms		
	No (n = 49)	Yes (n = 74)	P	No (n = 62)	Yes (n = 61)	P	No (n = 70)	Yes (n = 53)	P	No (n = 61)	Yes (n = 62)	P
Total	49(39.8%)	74(60.2%)		62(50.4%)	61(49.6%)		70(56.9%)	53(43.1%)		61(49.6%)	62(50.4%)	
Gender												
Male	21(42.9%)	13(17.6%)	0.002	21(30.6%)	13(24.6%)	0.453	22(31.4%)	12(22.6%)	0.281	21(34.4%)	13(21.0%)	0.095
Female	28(57.1%)	61(82.4%)		28(69.4%)	61(75.4%)		48(68.6%)	41(77.4%)		40(65.6%)	49(79.0%)	
Age (Mean ± SD)	38.49 ± 8.51	35.97 ± 7.32	0.083	37.18 ± 8.21	36.77 ± 7.59	0.776	36.64 ± 8.10	37.42 ± 7.62	0.592	37.59 ± 7.64	36.37 ± 8.12	0.393
Ethnicity												
Minority	20(40.8%)	41(55.4%)	0.113	24(38.7%)	37(60.7%)	0.015	29(41.4%)	32(60.4%)	0.037	24(39.3%)	37(59.7%)	0.024
Han	29(59.2%)	33(44.6%)		38(61.3%)	24(39.3%)		41(58.6%)	21(39.6%)		37(60.7%)	25(40.3%)	
Education level												
Bachelor or below	35(71.4%)	64(86.5%)	0.039	44(71.0%)	55(90.2%)	0.007	52(74.3%)	47(88.7%)	0.046	43(70.5%)	56(90.3%)	0.006
Master or doctorate	14(28.6%)	10(13.5%)		18(29.0%)	6(9.8%)		18(25.7%)	6(11.3%)		18(29.5%)	6(9.7%)	
Staff type												
Doctor	31(63.3%)	40(54.1%)	0.595	35(56.5%)	36(59.0%)	0.951	41(58.6%)	30(56.6%)	0.259	40(65.6%)	31(50.0%)	0.176
Nurse	13(26.5%)	24(32.4%)		19(30.6%)	18(29.5%)		18(25.7%)	19(35.8%)		16(26.2%)	21(33.9%)	
Others	5(10.2%)	10(13.5%)		8(12.9%)	7(11.5%)		11(15.7%)	4(7.5%)		5(8.2%)	10(16.1%)	
Staff title												
None or junior	13(26.5%)	35(47.3%)	0.040	19(30.6%)	29(47.5%)	0.158	29(41.4%)	19(35.8%)	0.561	18(29.5%)	30(48.4%)	0.091
Middle	17(34.7%)	23(31.1%)		23(37.1%)	17(27.9%)		20(28.6%)	20(37.7%)		22(36.1%)	18(29.0%)	
Sub-senior or senior	19(38.8%)	16(21.6%)		20(32.3%)	15(24.6%)		21(30.0%)	14(26.4%)		21(34.4%)	14(22.6%)	
Smoking (Yes)	14(28.6%)	7(9.5%)	0.006	11(17.7%)	10(16.4%)	0.842	12(17.1%)	9(17.0%)	0.981	10(16.4%)	11(17.7%)	0.842
Alcohol use (Yes)	25(51.0%)	28(37.8%)	0.148	30(48.4%)	23(37.7%)	0.232	32(45.7%)	21(39.6%)	0.499	30(49.2%)	23(37.1%)	0.176
Working department												
Fever outpatient/ Emergency/ Isolation unit/ ICU	8(16.3%)	11(14.9%)	0.826	9(14.5%)	10(16.4%)	0.906	10(14.3%)	9(17.0%)	0.359	11(18.0%)	8(12.9%)	0.386
Normal outpatient or inpatient unit	32(65.3%)	46(62.2%)		39(62.9%)	39(63.9%)		48(68.6%)	30(56.6%)		40(65.6%)	38(61.3%)	
Others (Medical laboratory/ Pharmacy/ Administrative department etc.)	9(18.4%)	17(23.0%)		14(22.6%)	12(19.7%)		12(17.1%)	14(26.4%)		10(16.4%)	16(25.8%)	

ICU, intensive care unit. The bold values are significant $P < 0.05$.

TABLE 3 | Prevalence of symptoms of acute stress, insomnia, depression, and anxiety stratified by pandemic-related factors and psychological characteristic factors.

	Depressive symptoms			Anxiety symptoms			Acute Stress symptoms			Insomnia symptoms		
	No (n = 49)	Yes (n = 74)	P	No (n = 62)	Yes (n = 61)	P	No (n = 70)	Yes (n = 53)	P	No (n = 61)	Yes (n = 62)	P
COVID-19-related questions												
Work requires contact with feverish or infected patients (Yes)	5(10.2%)	10(13.5%)	0.583	7(11.3%)	8(13.1%)	0.757	8(11.4%)	7(13.2%)	0.765	8(13.1%)	7(11.3%)	0.757
Infected with COVID-19 (No)	49(100%)	74(100%)	-	62(100%)	61(100%)	-	70(100%)	53(100%)	-	61(100%)	62(100%)	-
People around you infected with COVID-19 (Yes)	1(2.0%)	6(8.1%)	0.306	4(6.5%)	3(4.9%)	1.000	4(5.7%)	3(5.7%)	1.000	2(3.3%)	5(8.1%)	0.449
Worried about infection (Yes)	25(51.0%)	66(89.2%)	<0.001	38(61.3%)	53(86.9%)	0.001	43(61.4%)	48(90.6%)	<0.001	36(59.0%)	55(88.7%)	<0.001
Time spent on pandemic information everyday (>2 h)	18(36.7%)	38(51.4%)	0.111	22(35.5%)	34(55.7%)	0.024	29(41.4%)	27(50.9%)	0.294	28(45.9%)	28(45.2%)	0.934
Time spent on pandemic information before sleep (≥30 min)	17(34.7%)	41(55.4%)	0.024	24(38.7%)	34(55.7%)	0.059	24(34.3%)	34(64.2%)	0.001	22(36.1%)	36(58.1%)	0.015
Psychological characteristics												
CBF-PI-15												
Extraversion	11.31 ± 3.21	9.66 ± 3.10	0.005	11.03 ± 3.24	9.59 ± 3.08	0.013	11.39 ± 3.04	8.91 ± 2.95	<0.001	10.97 ± 3.04	9.68 ± 3.31	0.026
Agreeableness	14.35 ± 3.50	14.16 ± 2.65	0.740	14.39 ± 3.27	14.08 ± 2.73	0.576	13.99 ± 3.39	14.57 ± 2.41	0.291	14.23 ± 3.44	14.24 ± 2.54	0.982
Conscientiousness	14.02 ± 3.53	13.59 ± 2.74	0.454	13.89 ± 3.38	13.64 ± 2.74	0.656	13.67 ± 3.50	13.89 ± 2.42	0.688	13.85 ± 3.62	13.68 ± 2.44	0.754
Neuroticism	16.08 ± 2.00	19.23 ± 2.18	<0.001	16.44 ± 2.17	19.54 ± 2.03	<0.001	16.90 ± 2.40	19.40 ± 2.17	<0.001	16.90 ± 2.58	19.03 ± 2.19	<0.001
Openness	10.37 ± 4.25	10.22 ± 3.92	0.840	10.23 ± 4.12	10.33 ± 3.99	0.889	10.39 ± 3.98	10.13 ± 4.16	0.732	10.03 ± 4.33	10.52 ± 3.75	0.509
TCSQ												
Positive	35.20 ± 6.51	30.59 ± 6.80	<0.001	34.90 ± 6.64	29.92 ± 6.57	<0.001	34.47 ± 6.86	29.74 ± 6.39	<0.001	34.49 ± 7.10	30.40 ± 6.40	0.001
Negative	22.10 ± 7.62	25.81 ± 5.94	0.003	22.71 ± 7.31	25.98 ± 6.01	0.008	23.41 ± 7.55	25.55 ± 5.71	0.077	23.28 ± 7.72	25.37 ± 5.80	0.092
PSSS												
Strong(61–84)	36(73.5%)	32(43.2%)	0.001	46(74.2%)	22(36.1%)	<0.001	48(68.6%)	20(37.7%)	0.001	40(65.6%)	28(45.2%)	0.023
Moderate or poor(12–60)	13(26.5%)	42(56.8%)		16(25.8%)	39(63.9%)		22(31.4%)	33(62.3%)		21(34.4%)	34(54.8%)	

PSSS, Perceived Social Support Scale; TCSQ, Trait Coping Style Questionnaire; CBF-PI-15, The Chinese Big Five Personality Inventory-15. The bold values are significant $P < 0.05$.

TABLE 4 | Logistic regression analysis of factors related to mental health symptoms.

	Depressive symptoms			Anxiety symptoms			Acute Stress symptoms			Insomnia symptoms		
	Adjusted OR	95% CI	P	Adjusted OR	95% CI	P	Adjusted OR	95% CI	P	Adjusted OR	95% CI	P
Gender												
Male		Ref			Ref			Ref			Ref	
Female	1.84	0.60–5.64	0.286	0.51	0.14–1.86	0.310	1.23	0.43–3.52	0.697	1.04	0.40–2.68	0.940
Age												
	0.97	0.91–1.03	0.263	1.03	0.97–1.10	0.355	1.04	0.98–1.10	0.222	0.99	0.94–1.05	0.767
Ethnicity												
Han		-			Ref			-			-	
Minority		-		3.06	1.08–8.65	0.035		-			-	
Education level												
Bachelor or below		-			Ref			-			Ref	
Master or doctorate		-		0.19	0.04–0.86	0.030		-		0.28	0.09–0.86	0.026
Worried about infection												
No		Ref			-			-			-	
Yes	3.43	1.12–10.51	0.031		-			-			-	
Time spent on pandemic information before sleep												
<30 min		-			-			Ref			-	
≥30 min		-			-		3.14	1.25–1.88	0.015		-	
CBF-PI-15												
Extraversion		-			-		0.78	0.66–0.91	0.002		-	
Neuroticism	1.75	1.39–2.22	<0.001	1.91	1.48–2.47	<0.001	1.53	1.25–1.88	<0.001	1.41	1.19–1.67	<0.001
PSSS												
Strong(61–84)		-			Ref			-			-	
Moderate or poor(12–60)		-		4.68	1.68–13.03	0.003		-			-	

OR, odds ratio; CI, confidence interval; CBF-PI-1, The Chinese Big Five Personality Inventory-15; PSSS, Perceived Social Support Scale.

Binary logistic regression controlled for gender and age (enter method) as well as other demographic factors, pandemic-related factors, and psychological factors significantly associated with a certain kind of mental health problem (forward likelihood ratio method). The bold values are significant $P < 0.05$.

resources situation in Kashi. The shortage and impaired medical resources also aroused medical staffs' worry and fear, which may account for the higher prevalence of mental health problems among them.

In this study, we identified that minority ethnicities were more likely to have anxiety symptoms. A prior study done by Wang also revealed that the Tibetan (minority) cancer inpatients had a significantly higher incidence of anxiety than that of the Han (majority) cancer inpatients (25). The differences in culture and religious beliefs are thought to be the reason (25). Meanwhile, another study compares the death anxiety between Han and Tibetan ethnic group, showing that Tibetan respondents express more death anxiety, fear of death, death avoidance, and escape acceptance than the Han participants (26). Such differences are considered to attribute to their different culture, religious beliefs, and even implicit attitudes. On the contrary, a higher education level was found as a protective factor for insomnia and anxiety symptoms, which is consistent with previous studies (27, 28). Compared with those with a higher degree, individuals with a low education level may have more difficulty in understanding and confronting the pandemic, which may lead to the fear of COVID-19. Such fear may then particularly have an impact on the mental health of medical staffs with a low education level.

Worrying about infection was also identified as another factor associated with depressive symptoms while spending more than 30 min on pandemic-related information before sleep was also associated with acute stress symptoms. Some previous studies have discovered the association between worry and depression, which is consistent with our finding (29, 30). In regards to the relationship between time spent on pandemic information and acute stress symptoms, the association has not been reported yet, despite a previous study reveals bidirectional associations between the duration of mobile phone use and various sleep and mental outcomes such as depression and anxiety (31). Several mechanisms may explain the association. On one hand, the myriad of information received may increase their cognitive or emotional burden and increase their vulnerability to depression and anxiety (32), which may result in their vulnerability to acute stress. On the other hand, while the time spent on pandemic information may reflect the worry about the pandemic, stress reactivity is exacerbated by daily pandemic worry (33). However, further study should be completed to confirm this association.

We also found that the medical staffs who scored higher in the neuroticism subscale of CBF-PI-15 were more likely to develop depression, anxiety, acute stress, and insomnia symptoms, while those who scored higher in the extraversion subscale were less likely to suffer acute stress symptoms. Neuroticism consists of a person's tendency to experience negative feelings, anxiety, and psychological distress (34), while extraversion refers to the inclination to be energetic, sociable, and assertive, and conscientiousness encompasses organization, self-discipline, and determination (35). Several previous studies reveal that neuroticism is positively associated with various psychological problems, which is consistent with our study (36–39). At the same time, higher levels of extraversion are also found to be related to positive health outcomes (40).

Medical staffs who experienced more anxiety symptoms were found to have poorer social support. The same result comes from a cross-cultural study, in which resilience and social support are universal interrelated protective factors for mental health (41). Social support, which has been defined as information from others that one is loved and cared for, esteemed and valued, and part of a network of communication and mutual obligations (42), is widely recognized to have a great impact on people's health. It can be distinguished into structural and functional measures, and further measures can be divided into emotional, instrumental, and informational support (43). Facing the pandemic, medical staffs are in extreme need of functional measures of support, especially the emotional ones and the informational ones. Thus, obtaining better social support would help medical staffs reduce their risk of suffering from mental health problems.

In summary, continuous psychological support would be particularly important to medical staffs as the pandemic remains prolonged. Special care should be paid to those of minority ethnicities and those not well-educated. Besides, identifying the medical staffs who are more neurotic and giving them more special care may help to reduce their risk of experiencing psychological distress. Helping medical staffs to handle their worry and fear, to maintain good interpersonal relationship, and to have access to necessary functional support also plays an important role in the avoidance of negative health conditions.

To our best knowledge, this is the first study conducted to systematically investigate mental health conditions and to explore the related social psychological factors among medical staffs in Xinjiang who experienced the second wave of the COVID-19 pandemic. Our findings help to fill the gap in the understanding of the mental health status of medical staffs in Xinjiang during the resurgence period.

Our study has several limitations. First, due to the relatively poor economic resources as well as great language differences in Xinjiang, the study could hardly be conducted in a wider range. Because of such inconveniences, the snowball sampling method was used and the sample size was small in this survey, leaving the coverage and representativeness of our study limited. Second, this was a cross-sectional study, which means the associations between mental health conditions and predictors could not be considered as causal relationships. Third, all symptoms in the survey were self-reported instead of being diagnosed by profession, which may lead to report bias. Fourth, only medical staffs were included in this study, thus their mental health problems could not be compared directly with the public during this second wave of the pandemic, which requires further investigation. At last, other potential predictors, such as marital status or history of physical illness, also need special attention. However, this study only focused on some basic demographic factors and psychological factors, and thus did not elaborate on other possible related factors, which warrants further research.

CONCLUSION

In our study, the prevalence rate of depressive, anxiety, acute stress, and insomnia symptoms was high among medical

staffs in Kashi, Xinjiang who experienced the second wave of the COVID-19 pandemic. Several factors were found to be associated with mental health conditions. These findings could help identify medical staffs at risk for mental health problems and may help make precise mental health intervention policies during the resurgence period. Our study may also call for further research into Xinjiang 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 Ethics Committee of Nanfang Hospital, Southern Medical University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

YZ and JG shared the first authorship. BZ, MA, and YZ conceived and designed this study. YZ and JG conceived and conducted

statistical analyses, with additional advice regarding analyses contributed by SL, QZ, BZ, RA, AK, AS, YX, and AT. JG drafted the manuscript, and all authors contributed to editing it and approved the final manuscript.

FUNDING

This work was supported by the President Foundation of Nanfang Hospital, Southern Medical University [Grant Number 2019Z014], the Scientific Research Foundation of Southern Medical University [Grant Number CX2018N018], the National Natural Science Foundation of China [Grant Number 81901348], the Chinese Sleep Research Society Hansoh Project [Grant Number 2019HSC03], and the National Natural Science Foundation of China [Grant Number 82071488].

ACKNOWLEDGMENTS

We would like to thank all the individuals and organizations who contributed to this research. Firstly, to Nanfang Hospital, Southern Medical University for the support in the whole process. Secondly, to First People's Hospital of Kashi for their support and participating in the study. Thirdly, we would like to thank Dharendra Paudel for the critical reading of the manuscript.

REFERENCES

1. The Government of Xinjiang Uygur Autonomous Region of China. *Two novel coronavirus cases were confirmed for the first time in Xinjiang*. (2020). Available online at: <http://www.xinjiang.gov.cn/xinjiang/c100225/202001/387cab88b6264cc5995d045f9d5d601a.shtml> (accessed 28 December, 2020).
2. The Government of Xinjiang Uygur Autonomous Region of China. *No new confirmed cases or asymptomatic infections were reported in Xinjiang (including the XPCC) on August 18*. (2020). Available online at: <http://www.xinjiang.gov.cn/xinjiang/tzgg/202008/55245d1e0cf24bedb7cd3129f35f175b.shtml> (accessed 23 March, 2021).
3. National Health Commission of the PRC. *August 21 Daily briefing on novel coronavirus cases in China*. (2020). Available online at: <http://www.nhc.gov.cn/xcs/yqtb/202008/d3ac3a68c25249adb5df9f0cb58820f3.shtml> (accessed March 23, 2021).
4. The Government of Xinjiang Uygur Autonomous Region of China. *On October 24, there was no new confirmed case in Xinjiang (including XPCC)*. (2020). Available online at: <http://www.xinjiang.gov.cn/xinjiang/tzgg/202010/59429f3d9eaa4f09bf678dbcb1bb8a57f.shtml> (accessed 28 December, 2020).
5. Wu T, Jia X, Shi H, Niu J, Yin X, Xie J, et al. Prevalence of mental health problems during the COVID-19 pandemic: a systematic review and meta-analysis. *J Affect Disord*. (2020) 281:91–8. doi: 10.1016/j.jad.2020.11.117
6. Liu CY, Yang YZ, Zhang XM, Xu X, Dou QL, Zhang WW, et al. The prevalence and influencing factors in anxiety in medical workers fighting COVID-19 in China: a cross-sectional survey. *Epidemiol Infect*. (2020) 148:e98. doi: 10.1017/S0950268820001107
7. Zhang C, Yang L, Liu S, Ma S, Wang Y, Cai Z, et al. Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. *Front Psychiatry*. (2020) 11:3542175. doi: 10.2139/ssrn.3542175
8. Zhu J, Sun L, Zhang L, Wang H, Fan A, Yang B, et al. Prevalence and influencing factors of anxiety and depression symptoms in the first-line medical staff fighting against COVID-19 in Gansu. *Front Psychiatry*. (2020) 11:3550054. doi: 10.2139/ssrn.3550054
9. Wang Y, Duan Z, Peng K, Li D, Ou J, Wilson A, et al. Acute stress disorder among frontline health professionals during the COVID-19 outbreak: a structural equation modelling investigation. *Psychosom Med*. (2020). doi: 10.1097/PSY.0000000000000851. [Epub ahead of print].
10. Xiao H, Zhang Y, Kong D, Li S, Yang N. The effects of social support on sleep quality of medical staff treating patients with Coronavirus Disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci Monit*. (2020) 26:e923549. doi: 10.12659/MSM.923549
11. Nikčević AV, Marino C, Kolubinski DC, Leach D, Spada MM. Modelling the contribution of the Big Five personality traits, health anxiety, and COVID-19 psychological distress to generalised anxiety and depressive symptoms during the COVID-19 pandemic. *J Affect Disord*. (2021) 279:578–84. doi: 10.1016/j.jad.2020.10.053
12. Chang J, Hu L, Guan Q. Investigation and analysis of psychological stress response of medical staff in a grade II hospital of Xinjiang army during the outbreak of coronavirus disease. *J Nongken Med*. (2020) 42:328–32. Available online at: <https://kns.cnki.net/kcms/detail/detail.aspx?FileName=NKXX202004011&DbName=CJFQ2020>
13. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. (2001) 16:606–13. doi: 10.1046/j.1525-1497.2001.016009606.x
14. Lowe B, Decker O, Muller S, Brahler E, Schellberg D, Herzog W, et al. Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Med Care*. (2008) 46:266–74. doi: 10.1097/MLR.0b013e318160d093
15. Thoresen S, Tambs K, Hussain A, Heir T, Johansen VA, Bisson JI. Brief measure of posttraumatic stress reactions: impact of Event Scale-6. *Soc Psych Psych Epid*. (2010) 45:405–12. doi: 10.1007/s00127-009-0073-x
16. Li X, Lv S, Liu L, Chen R, Chen J, Liang S, et al. COVID-19 in Guangdong: immediate perceptions and psychological impact on 304,167 college students. *Front Psychol*. (2020) 11:2024. doi: 10.3389/fpsyg.2020.02024

17. Morin CM, Belleville G, Belanger L, Ivers H. The Insomnia Severity Index: psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep*. (2011) 34:601–8. doi: 10.1093/sleep/34.5.601
18. Zhang X, Wang MC, He L, Jie L, Deng J. The development and psychometric evaluation of the Chinese Big Five Personality Inventory-15. *PLoS ONE*. (2019) 14:e0221621. doi: 10.1371/journal.pone.0221621
19. Jiang Q, Zhu Y. Further explorations for a coping style questionnaire. *Chin J Behav Med Sci*. (1999) 8:167–9.
20. Zimet GD, Dahlem NW, Zimet SG, Farley GK. (1988). The multidimensional scale of perceived social support. *J Person Assess* 52:30–41. doi: 10.1207/s15327752jpa5201_2
21. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun*. (2020) 88:901–7. doi: 10.1016/j.bbi.2020.05.026
22. Taha S, Matheson K, Cronin T, Anisman H. Intolerance of uncertainty, appraisals, coping, and anxiety: the case of the 2009 H1N1 pandemic. *Br J Health Psychol*. (2014) 19:592–605. doi: 10.1111/bjhp.12058
23. Bakioglu F, Korkmaz O, Ercan H. Fear of COVID-19 and positivity: mediating role of intolerance of uncertainty, depression, anxiety, and stress. *Int J Ment Health Addict*. (2020) 28:1–14. doi: 10.1007/s11469-020-00331-y
24. Lauriola M, Carleton RN, Tempesta D, Calanna P, Socci V, Mosca O, et al. A correlational analysis of the relationships among intolerance of uncertainty, anxiety sensitivity, subjective sleep quality, insomnia symptoms. *Int J Environ Res Public Health*. (2019) 16:3253. doi: 10.3390/ijerph16183253
25. Wang Y, Mei C, Fu Y, Yue Z, Jiang Y, Zhu J. Anxiety and depression among Tibetan inpatients with cancer: a multicenter investigation. *Ann Palliat Med*. (2020) 9:3776–84. doi: 10.21037/apm-20-1721
26. Yin F, He Y, He Y, Shen H, Ip K. A comparative study of death anxiety and death attitudes in Han and Tibetan ethnic groups. *Death Stud*. (2020). doi: 10.1080/07481187.2020.1802791. [Epub ahead of print].
27. Xiang YT, Ma X, Cai ZJ, Li SR, Xiang YQ, Guo HL, et al. The prevalence of insomnia, its sociodemographic and clinical correlates, and treatment in rural and urban regions of Beijing, China: a general population-based survey. *Sleep*. (2008) 31:1655–62. doi: 10.1093/sleep/31.12.1655
28. Shi L, Lu Z, Que J, Huang X, Liu L, Ran M, et al. Prevalence of and risk factors associated with mental health symptoms among the general population in China during the Coronavirus Disease 2019 pandemic. *JAMA Netw Open*. (2020) 3:e2014053. doi: 10.1001/jamanetworkopen.2020.14053
29. Yook K, Kim KH, Suh SY, Lee KS. Intolerance of uncertainty, worry, and rumination in major depressive disorder and generalized anxiety disorder. *J Anxiety Disord*. (2010) 24:623–8. doi: 10.1016/j.janxdis.2010.04.003
30. Gorday JY, Rogers ML, Joiner TE. Examining characteristics of worry in relation to depression, anxiety, and suicidal ideation and attempts. *J Psychiatr Res*. (2018) 107:97–103. doi: 10.1016/j.jpsychires.2018.10.004
31. Liu S, Wing YK, Hao Y, Li W, Zhang J, Zhang B. The associations of long-time mobile phone use with sleep disturbances and mental distress in technical college students: a prospective cohort study. *Sleep*. (2019) 42:213. doi: 10.1093/sleep/zsy213
32. Yen CF, Tang TC, Yen JY, Lin HC, Huang CF, Liu SC, et al. Symptoms of problematic cellular phone use, functional impairment and its association with depression among adolescents in Southern Taiwan. *J Adolesc*. (2009) 32:863–73. doi: 10.1016/j.adolescence.2008.10.006
33. Nelson NA, Bergeman CS. Daily stress processes in a pandemic: the effects of worry, age, and affect. *Gerontologist*. (2020) 61:196–204. doi: 10.1093/geront/gnaa187
34. Maggio MG, Cuzzola MF, Latella D, Impellizzeri F, Todaro A, Rao G, et al. How personality traits affect functional outcomes in patients with multiple sclerosis: a scoping review on a poorly understood topic. *Mult Scler Relat Disord*. (2020) 46:102560. doi: 10.1016/j.msard.2020.102560
35. Bibbey A, Carroll D, Roseboom TJ, Phillips AC, de Rooij. Personality SR, and physiological reactions to acute psychological stress. *Int J Psychophysiol*. (2013) 90:28–36. doi: 10.1016/j.ijpsycho.2012.10.018
36. Kotov R, Gamez W, Schmidt F, Watson D. Linking “big” personality traits to anxiety, depressive, and substance use disorders: a meta-analysis. *Psychol. Bull.* (2010) 136:768–821. doi: 10.1037/a0020327
37. Duggan KA, Friedman HS, McDevitt EA, Mednick SC. Personality and healthy sleep: the importance of conscientiousness and neuroticism. *PLoS ONE*. (2014) 9:e90628. doi: 10.1371/journal.pone.0090628
38. Kennair L, Solem S, Hagen R, Havnen A, Nysaeter TE, Hjemdal O. Change in personality traits and facets (NEO-PI-R) following metacognitive therapy or cognitive behavior therapy for generalized anxiety disorder: results from a randomized controlled trial. *Clin Psychol Psychother*. (2020). doi: 10.1002/cpp.2541. [Epub ahead of print].
39. Robillard R, Saad M, Edwards J, Solomonova E, Pennestri M, Daros A, et al. Social, financial and psychological stress during an emerging pandemic: observations from a population survey in the acute phase of COVID-19. *BMJ Open*. (2020) 10:e043805. doi: 10.1136/bmjopen-2020-043805
40. Macía P, Gorbéña S, Gómez A, Barranco M, Iraurgi I. Role of neuroticism and extraversion in the emotional health of people with cancer. *Heliyon*. (2020) 6:e04281. doi: 10.1016/j.heliyon.2020.e04281
41. Brailovskaia J, Schönfeld P, Zhang XC, Bieda A, Kochetkov Y, Margraf J. A cross-cultural study in Germany, Russia, and China: are resilient and social supported students protected against depression, anxiety, and stress? *Psychol Rep*. (2017) 121:265–81. doi: 10.1177/0033294117727745
42. Kim HS, Sherman DK, Taylor SE. Culture and social support. *Am Psychol*. (2008) 63:518–26. doi: 10.1037/0003-066X
43. Helgeson VS. Social support and quality of life. *Qual Life Res*. (2003) 12:25–31. doi: 10.1023/A:1023509117524

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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Association Between Perceived Stress and Post-Traumatic Stress Disorder Among Medical Staff During the COVID-19 Epidemic in Wuhan City

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OPEN ACCESS

Edited by:

Lawrence T. Lam,
University of Technology
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Reviewed by:

Wallace Chan,
The Chinese University of Hong
Kong, China
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St George's, University of London,
United Kingdom

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Specialty section:

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

Received: 10 February 2021

Accepted: 21 May 2021

Published: 26 July 2021

Citation:

Mei S, Liang L, Ren H, Hu YY, Qin Z,
Cao R, Li C, Fei J, Yuan T, Meng C,
Guo X, Lv J and Hu YC (2021)
Association Between Perceived Stress
and Post-Traumatic Stress Disorder
Among Medical Staff During the
COVID-19 Epidemic in Wuhan City.
Front. Public Health 9:666460.
doi: 10.3389/fpubh.2021.666460

Objective: The study aimed to examine the relationship between perceived stress and post-traumatic stress disorder (PTSD) among frontline medical staff during the lockdown in Wuhan city, China, due to the COVID-19 outbreak.

Methods: The study was conducted in August 2020, which included 516 medical staff between 21 to 65 years. The PTSD Checklist-Civilian, Perceived Stress Scale, Insomnia Severity Index, and Compassion Fatigue Short Scale were used.

Results: The results indicated that 10.5% of the medical staff experienced PTSD symptoms, and insomnia severity mediated the effect of perceived stress on PTSD. In addition, compassion fatigue moderated the association between perceived stress and PTSD.

Conclusion: The study elucidated the mechanisms underlying the association between perceived stress and PTSD. Moreover, it emphasized the importance of long-term monitoring of the mental health status of frontline medical staff who supported Wuhan. The results can serve as reference for relevant medical and health departments to formulate active interventions and preventive measures against PTSD for unsung heroes who put their lives on the line during difficult times.

Keywords: perceived stress, post-traumatic stress disorder, COVID-19, frontline medical staff, Insomnia severity, compassion fatigue

INTRODUCTION

In December 2019, a new type of coronavirus (SARS-CoV-2) was reported in Wuhan, China. The World Health Organization (WHO) assigned the name COVID-19 to the resulting disease, which is characterized by acute respiratory symptoms with varying severity. COVID-19 eventually became a public health emergency at a global scale and led to tremendous impacts on public health (1). At the peak of the crisis, a large number of medical professionals in China answered the call from the government, and headed to Wuhan, the epicenter of the epidemic, to contain the situation (2). At the time, the entire city was under lockdown, and the number of patients was overwhelming.

The medical staff faced many challenges, such as excessive workloads, ethical and moral conflicts, potential risk of infection in the workplace, harsh living environments, and limited medical supplies (3, 4). These factors were deemed to create high-stress and high-pressure environments, which undoubtedly led to serious psychological problems.

PTSD is a mental illness that most likely occurs in traumatized individuals during or after emergencies. It refers to continued trauma even after traumatic events, continued avoidance of stimuli related to such events, numbness, and increased arousal symptoms (5). PTSD consists of various dimensions, such as intrusion, avoidance, negative cognitive and emotional changes, and hyper-arousal (6). Previous studies found that medical staff developed varying degrees of PTSD symptoms during the COVID-19 epidemic, which indicated that they also suffered from PTSD-related symptoms (7, 8). As a result of the difficult working and living environments in Wuhan during the lockdown, the designated medical staff faced heavy stress and psychological distress, which increased the risk of developing PTSD symptoms (4). Moreover, medical staff with PTSD re-live their work experience in Wuhan through nightmares or vivid and intrusive memories, which are frequently accompanied by strong fears and physical sensations (9). These symptoms can last for at least a few weeks and can exert a serious impact on family, education, occupation, and other important life aspects of the medical staff. Thus, understanding the possible causes and influencing factors that render the medical staff assigned to Wuhan during the lockdown more vulnerable to PTSD is very important under the normalization of epidemic prevention and control.

Medical personnel, such as doctors and nurses, obtained direct contact with patients with COVID-19 due to the nature of the profession. Even with personal protective equipment, the possibility of becoming infected aroused fear among them, especially during the prophase of the epidemic where less was known about the new strain of virus. Knowing that no effective treatment or medicine exists to combat the disease created an enormous pressure on medical staff. Stress is the adaptive response of individuals to internal or external threat (10). Specifically, perceived stress refers to the degree of pressure assessed by an individual about events encountered and their ability to cope (11). During major public health emergencies, such as the COVID-19 epidemic, medical staff undergo pressure as a result of the challenges they face on a daily basis (4, 12). Previous research found that perceived stress is strongly correlated to PTSD (13).

Based on the diathesis-stress models of PTSD, traumatic events, such as the COVID-19 epidemic, were the main stimulus factors for PTSD symptoms among frontline medical staff. Moreover, the interaction with susceptibility factors is associated with the development of PTSD (14). Perceived stress was one of the psychological susceptibility factors of PTSD, such that individuals who underwent trauma were more likely to develop PTSD when faced with high levels of psychological susceptibility. Thus, this study proposes the following hypothesis:

Hypothesis 1: During the COVID-19 epidemic, the perceived stress of frontline medical staff is predicted to significantly increase PTSD.

During the early stages of the COVID-19 outbreak, insomnia was one of the main psychological conditions faced by the medical staff in Wuhan (15). Relevant research found that the prevalence of insomnia as a result of the COVID-19 epidemic among medical staff ranged from 32.0 to 49.9% (16, 17), which suggested that insomnia exerted serious impacts on physical and mental health. Adequate sleep is one of the important conditions necessary for the maintenance of physical health. Regrettably, this condition is extremely difficult to achieve for medical staff who worked in Wuhan during the lockdown. As such, they were required to deal constantly with unexpected emergencies and sudden changes in surroundings, which may lead to various sleep-related problems (18). The existing conditions, such as risk of infection, shortage of medical supplies, and inconclusive treatment plans increased the level of stress, which only aggravated sleeping problems (16, 19). Inevitably, medical staff with high levels of perceived stress are more likely to suffer from insomnia. Moreover, previous studies demonstrated that sleeping problems are closely related to PTSD (20). In fact, insomnia is one of the core symptoms of PTSD, which further indicates the correlation between insomnia severity and PTSD (6). In summary, medical staff with high levels of perceived stress are susceptible to insomnia, which can increase the chances of developing PTSD symptoms. Thus, this study proposes the following hypothesis:

Hypothesis 2: During the COVID-19 epidemic, the perceived stress of frontline medical staff can influence PTSD through the mediating effect of insomnia severity.

Compassion fatigue is an important factor related to the work pressure of medical staff (21), which is defined as secondary traumatic stress experienced by medical staff by witnessing the suffering of patients (22). Compassion fatigue originates from the “cost of caring” of frontline medical staff to patients suffering from psychological distress caused by COVID-19 (23). Medical staff during the COVID-19 outbreak worried about transmitting the virus to their families and friends albeit unintentionally (24). Such prolonged stress is highly likely to cause compassion fatigue. Compassion fatigue is a state of physical, emotional, social, and spiritual exhaustion of medical staff, which is caused by stress associated with prolonged contact with COVID-19 patients and intense fear of infection (25). Furthermore, health care workers suffering from compassion fatigue may be afraid of patients they care for, causing them to show avoidance behaviors in the doctor-patient relationship (26), which could be a way for them to cope with tremendous pressure. Many studies report that medical staff are normally full of compassion, which is an important quality required to provide patients with high-quality medical care (27). In general, medical staff can convert perceived stress into motivation to help patients, which encourages them to overcome the difficulties of their profession. However, in the case of prolonged work-related stress, they experience energy depletion and exhaustion, which leads

to feelings of powerlessness, negative and intrusive thoughts, increased mental distance from the profession and patients, and eventually emotional fatigue (28). Based on the conservation of resources theory proposed by Hobfoll (29), individuals with sufficient resources to cope with demands from the internal and external environments are under less pressure. An individual can derive these resources intrinsically or extrinsically. Frontline medical staff are required to display great compassion when caring for COVID-19 patients. However, they may be unable to obtain sufficient resources to meet this demand due to the medical environment and pressure at the time. In this manner, their internal resources can be exhausted and cause symptoms of compassion fatigue, such as burnout and trauma. The fact that the symptoms of compassion fatigue and PTSD overlap indicates that compassion fatigue can aggravate PTSD symptoms. Thus, this study proposes the following hypothesis and the specific model hypothesis is shown in **Figure 1**.

Hypothesis 3: Compassion fatigue plays a moderating role in the relationship between perceived stress, insomnia severity, and PTSD symptoms.

METHODS

Participants and Procedures

This study was conducted in August 2020. The researchers recruited medical staff from a northeast province, who provided support in Wuhan, Hubei Province during the lockdown due to the COVID-19 outbreak. The inclusion criteria were as follows: (1) the frontline medical staff were assigned to local hospitals in Wuhan to assist in epidemic control and prevention during the early stages of the COVID-19 outbreak. (2) The frontline medical staff provided their services for at least one and a half months. The exclusion criteria were as follows: (1) participants with incomplete questionnaires and (2) frontline medical staff restricted by their physical health to complete the questionnaire. A total of 1,209 frontline medical staff in a province in the northeast of China supported Wuhan in the fight against COVID-19. Among them, 659 frontline medical staff did not participate in the investigation due to work reasons, physical health, and failure to meet the inclusion criteria during the investigation. Thus, the conservative response rate was estimated to be 45.5%. After considering health and safety, the study used electronic questionnaires, which were distributed via a popular social network smartphone application called WeChat. Finally, a total of 550 questionnaires were collected for the study. After screening, a total of 516 questionnaires were returned for a valid response rate of 93.8%. Before data collection, the participants provided written informed consent and verbally confirmed the consent to the researchers.

Instruments

PTSD Checklist-Civilian Version

The PCL-C is a widely used checklist to assess the PTSD status of patients after traumatic events and is used to measure the level of PTSD in medical staff (30). The PCL-C is composed of 17 items, which are rated using a five-point Likert-type scale to assess three

symptom clusters, namely, re-experience, avoidance/numbing, and hyper-arousal. The total scores range from 17 to 85 (31). The higher the score, the more severe the PTSD symptoms. Moreover, participants who scored 38 or above are considered to have PTSD (32). Previous studies on emergencies reported that the scale displayed good reliability and validity (33). In the current study, the Cronbach's alpha coefficient for PTSD was 0.909.

Perceived Stress Scale

The Perceived Stress Scale (PSS) is composed of 10 items that evaluate the perceived stress of participants over the past month (34). Each item is rated using a five-point Likert-type scale (0 = never; 1 = almost never; 2 = sometimes; 3 = fairly often; 4 = very often). The total scores range from 0 to 40 points. The higher the score, the higher the level of perceived stress. Other studies widely used the scale, which displayed good reliability and validity (35). In the current study, Cronbach's alpha coefficient for the PSS was 0.712.

Insomnia Severity Index

The Insomnia Severity Index (ISI) is mainly used to assess the severity of subjective insomnia of participants in the past two weeks (36). The scale is composed of seven items, which are rated using a five-point Likert-type scale (0 = no problem; 4 = very severe problem). The total scores range from 0 to 28 points and are categorized into no insomnia (0–7), subthreshold (8–14), moderate (15–21), and severe (22–28) forms of insomnia. The scale displayed high reliability and validity in other studies (37, 38). The study established Cronbach's alpha at 0.923 as the reliability coefficient of the scale.

Compassion Fatigue Short Scale

Furthermore, the study employed Compassion Fatigue Short Scale (CFSS) developed by Adams, Boscarino, and Figley to evaluate compassion fatigue (39). The scale includes two dimensions, namely, (1) a five-item secondary trauma scale, and (2) an eight-item job burnout scale. The participants selected appropriate options based on their true feelings during the COVID-19 epidemic and rated each item using a 10-point Likert scale ranging from 1 (rarely/never) to 10 (very often) (40). The scale has been widely applied to Chinese emergency workers and displayed excellent constructs and cross-validation (40). Other studies in China reported the good reliability and validity of the scale and the excellent reliability of the subscales. The total scale was constructed in accordance with the original CF-Short Scale (39, 41). The current study found a Cronbach's alpha coefficient of 0.896.

Data Analysis

Descriptive analysis was used for the basic sociodemographic characteristics of the participants, whereas correlation analysis was used to examine the associations among research variables. SPSS 24.0 (IBM Corp) and a PROCESS 3.2 macro were used to analyze the research variables. Statistical significance was set to $P < 0.05$. Moreover, the study employed one-way ANOVA to analyze differences between sociodemographic variables in PTSD. Multiple linear regression and the PROCESS macro were

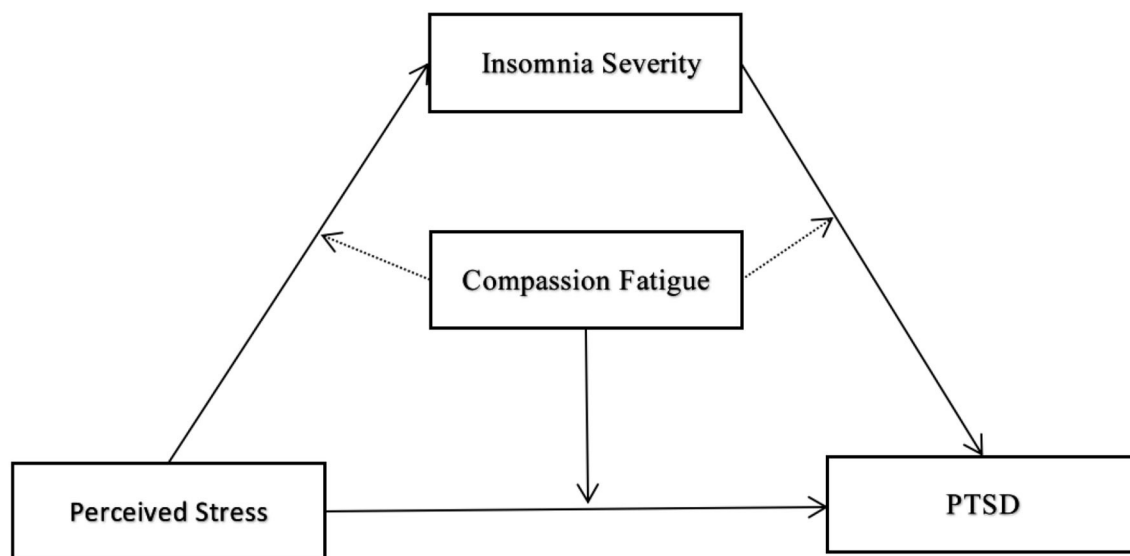


FIGURE 1 | The conceptual framework of the moderated mediation model.

used to verify the mediating effect of insomnia severity and the moderating effect of compassion fatigue on all paths of the model. Finally, the study used 95% bootstrap confidence intervals (95% CI) based on 5,000 bootstrapped samples.

RESULTS

Sample Characteristic

The study surveyed 516 medical staff who provide support in Wuhan to contain the spread of COVID-19. The age ranged from 21 to 65 years (mean = 37.74 years, SD = 8.87). The sample was composed of 415 (80.42%) women and 101 (19.58%) men, out of which 130, 349, and 37 participants had obtained a bellow university degree, university degree, and master's degree or above, respectively. Furthermore, 119, 376, and 21 participants were single, married, and divorced/widowed, respectively. One-way ANOVA found a statistical significance between gender and between those who were or were not worried about exposure to patients without symptoms. **Table 1** provides the descriptive statistics of the participants.

Preliminary Analyses

Table 2 displays the means, standard deviations, and bivariate correlations between research variables, which were positively correlated and exhibited significant statistical significance.

Testing for the Mediation Effect

This study employed multiple linear regression as proposed by Baron (42) to verify the mediation model of the study. As a result, the study constructed three models to verify the mediating effect of insomnia severity on the relationship between perceived stress and PTSD. Model 1 indicated that perceived stress had a significant predictive effect on PTSD ($\beta = 0.458$, $P < 0.001$), whereas model 2 pointed to the significant predictive

effect of perceived stress on insomnia severity ($\beta = 0.482$, $P < 0.001$). Finally, when perceived stress and insomnia severity were included into the regression model as predictors, the study found that the predictive effect of PTSD remained significant. Furthermore, the study used SPSS-PROCESS macro (model 4) to further test the mediation model, which is based on the bootstrap method. The result indicated that 95% CI does not contain 0 [95% CI = (0.376, 0.583)], which indicates that perceived stress is not only related to PTSD but also indirectly related to PTSD through insomnia severity. For more information, see **Table 3**.

Testing for the Moderated Mediation Effect

As displayed in **Table 4**, perceived stress ($\beta = 0.274$, $P < 0.001$) but not compassion fatigue ($\beta = 0.045$, $P > 0.05$) can significantly predict insomnia. However, the interaction terms of perceived stress and compassion fatigue ($\beta = 0.003$, $P > 0.05$) remained non-significant in predicting insomnia severity.

Thus, compassion fatigue does not moderate the relationship between perceived stress and insomnia severity. In the next step, the study used PTSD as the dependent variable to verify whether compassion fatigue plays a role in moderating the relationship between perceived stress and PTSD as well as between insomnia severity and PTSD. The results indicated that the interaction between perceived stress and compassion fatigue could be significant in predicting PTSD ($\beta = 0.011$, $P < 0.001$). In other words, compassion fatigue moderated the direct effects of the moderated mediation. However, the interaction between insomnia severity and compassion fatigue in predicting PTSD was statistically non-significant ($\beta = 0.003$, $P > 0.05$). Thus, compassion fatigue does not exert a moderating effect on the relationship between insomnia severity and PTSD.

To further verify the moderated mediation model, the study applied the PROCESS macro method (model 59), which is based on the bootstrap method. The result indicated that compassion

TABLE 1 | Demographic characteristics of the participants and associations with PTSD ($n = 516$).

Variable		N (%)	PTSD	F/t
Gender				1.46*
	Female	415 (80.42)	26.08 ± 9.08	
	Male	101 (19.58)	27.38 ± 8.24	
Age				0.95
	21–35	249 (48.26)	26.67 ± 8.50	
	36–50	212 (41.09)	28.06 ± 8.78	
	51–65	55 (10.65)	25.56 ± 5.95	
Education				1.25
	Below University degree	130 (25.19)	27.09 ± 8.38	
	University degree	349 (67.64)	27.15 ± 8.55	
	Master's degree or above	37 (7.17)	26.97 ± 7.46	
Marital status				0.94
	Single	119 (23.06)	26.07 ± 7.92	
	Married	376 (72.87)	27.32 ± 8.53	
	Divorced/widowed	21 (4.07)	29.67 ± 8.75	
Employee type				1.28
	Nurse	328 (63.57)	27.62 ± 8.59	
	Doctor	101 (19.57)	26.94 ± 9.43	
	Medical technician	62 (12.02)	25.13 ± 5.32	
	Other	25 (4.84)	26.40 ± 7.64	
Technical title				0.80
	Other	16 (3.10)	28.50 ± 9.23	
	Junior	231 (44.77)	27.02 ± 8.37	
	Intermediate	153 (29.65)	26.77 ± 7.87	
	Senior	116 (22.48)	27.62 ± 9.16	
Daily working hours during the epidemic				1.22
	<9h	222 (43.02)	26.19 ± 7.76	
	9–10h	101 (19.57)	27.31 ± 7.47	
	11–12h	40 (7.75)	29.00 ± 9.88	
	>12h	153 (29.66)	27.88 ± 9.39	
Are you worried about being exposed to asymptomatic infections				1.73**
	Yes	354 (68.6)	28.18 ± 8.70	
	No	162 (31.4)	24.83 ± 7.29	

* $P < 0.05$; ** $P < 0.001$.

fatigue moderates the relationship between perceived stress and PTSD because the 95% CI does not contain 0 [95% CI = (0.005, 0.018)]. However, compassion fatigue did not moderate the relationship between perceived stress and insomnia severity [95% CI = (−0.001, 0.008)] and between insomnia severity and PTSD [95% CI = (−0.002, 0.008)]. To further illustrate the moderating effect of compassion fatigue, the study used a simple slope test. As shown in **Table 5** and **Figure 2**, high levels of perceived stress were associated with high levels of PTSD (β_{simple}

TABLE 2 | Descriptive statistics and correlation among variables.

Variables	1	2	3	4
PTSD	1			
PS	0.46**	1		
ISI	0.69**	0.48**	1	
CF	0.62**	0.45**	0.51**	1
M	27.13	17.76	8.18	30.96
SD	8.42	5.23	5.87	17.49

PS, perceived stress; ISI, insomnia severity index; CF, compassion fatigue.

** $P < 0.01$.**TABLE 3 |** Mediated regression analysis for PS and ISI on PTSD.

Variable	Model 1 (PTSD)		Model 2 (ISI)		Model 3 (PTSD)	
	β	t	β	t	β	t
PS	0.458	11.685***	0.482	12.458***	0.163	4.564***
ISI					0.613	17.190***
R^2	0.210		0.232		0.499	
F	136.541***		155.216***		255.143***	

PS, perceived stress; ISI, insomnia severity index; CF, compassion fatigue.

*** $P < 0.001$.**TABLE 4 |** Testing the moderated mediation effect of CF.

Variable	β	SE	t
Mediator variable model (Outcome: ISI)			
PS	0.274	0.068	3.976***
CF	0.045	0.048	0.944
PS × CF	0.003	0.002	1.647
Dependent variable model (Outcome: PTSD)			
PS	−0.132	0.096	−1.365
ISI	0.577	0.094	6.098***
CF	−0.103	0.054	−1.890
PS × CF	0.011	0.003	3.559***
ISI × CF	0.003	0.002	1.185

PS, perceived stress; ISI, insomnia severity index; CF, compassion fatigue.

*** $P < 0.001$.

= 0.415, $t = 4.562$, $P < 0.001$) among individuals with high levels of compassion fatigue. However, for individuals with low levels of compassion fatigue, the moderation effect was non-significant ($\beta_{\text{simple}} = 0.020$, $t = 0.306$, $P > 0.05$).

DISCUSSION

The study aimed to explore the potential connections between PTSD, perceived stress, insomnia severity, and compassion fatigue among medical staff from the northeast province who provided medical support in Wuhan during the lockdown due to the COVID-19 outbreak. The study found that 10.5% of the medical staff were reported with PTSD symptoms.

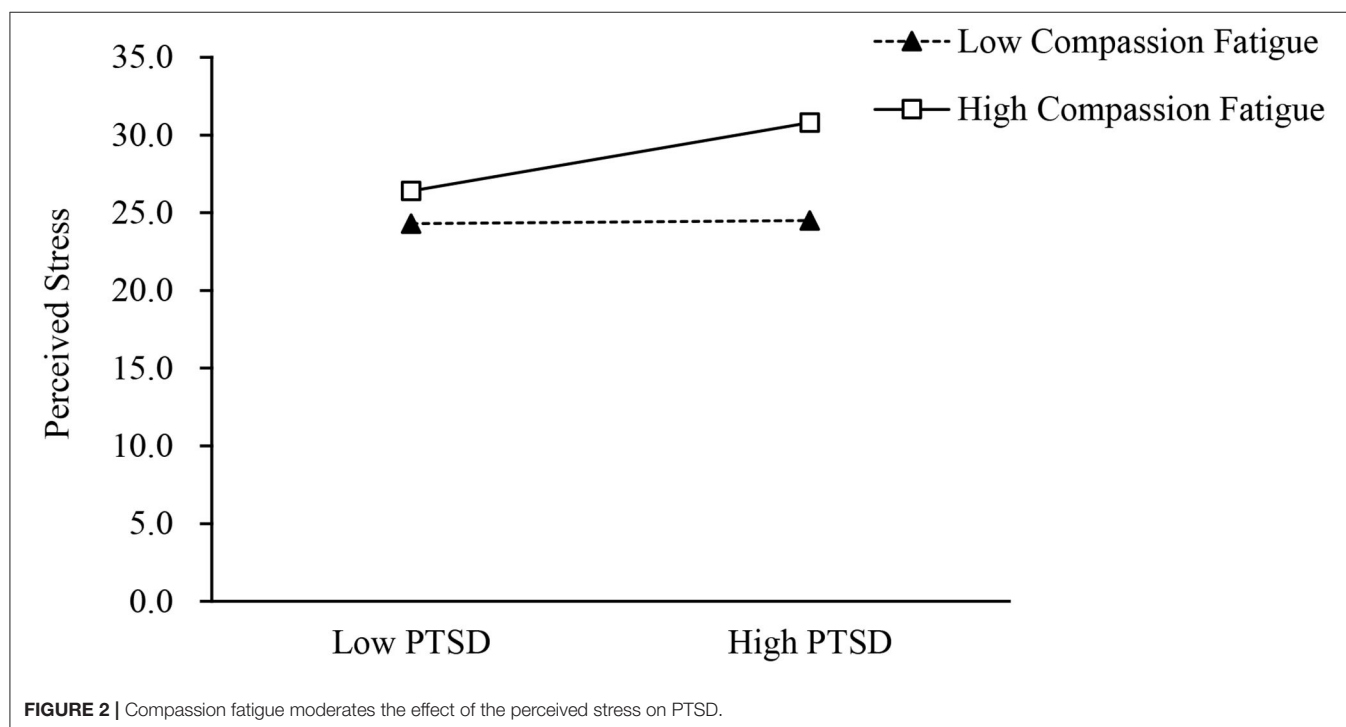
TABLE 5 | The moderating effect of compassion fatigue.

Variables		Effect	Boot 95% CI
Conditional indirect effect analysis			
1 SD below the mean	13.471	0.020	(−0.108, 0.149)
Mean	30.957	0.217	(0.106, 0.329)
1 SD above the mean	48.444	0.415	(0.236, 0.594)

This result is in close agreement with those found for rapid systematic reviews and meta-analyses on the reported rates of PTSD among medical staff during the COVID-19 pandemic (43). However, this rate for PTSD was higher than those of the Chinese public (4.6%) one month after the COVID-19 outbreak in China (44) and a similar report on PTSD (10.4%) among Chinese adolescents in June 2020 (45). This comparison highlighted the importance of paying attention to the PTSD status quo of frontline medical workers in Wuhan during the fight against COVID-19. Furthermore, the current study was conducted in August 2020. In terms of the timeframe, relevant studies illustrated that PTSD displayed a downward trend over time after traumatic events (46). However, the current study found that after 6 months of supporting Wuhan, the levels of PTSD symptoms of the medical staff remained relatively high. Therefore, even during the normalization phase of the epidemic, offering and implementing psychological interventions for medical staff with PTSD symptoms are considered very important. In addition, the study found a statistical significance between gender differences and whether the participants were concerned about exposure to asymptomatic infection and PTSD

symptoms. The results suggested that men were more likely to exhibited PTSD symptoms than women, which is consistent with the results of a study conducted during the COVID-19 epidemic (8), although contrary to the results of other studies on COVID-19 (47). The differences could be the result of differences in the times when these studies were conducted. Female medical staff may display PTSD symptoms when they first participated in the fight against COVID-19, which disappeared over time (48). In addition, female medical staff also tended to pay more attention to their own experiences and feelings, and are more willing to express their emotions with family and friends, which is conducive to for the self-regulation of emotions (49). However, male medical staff may opt out of self-emotion regulation, such that they recover more slowly than women and show more PTSD symptoms. Similarly, medical staff who were concerned about asymptomatic infection are more likely to exhibit PTSD symptoms. A possible reason for this finding is that during the COVID-19 outbreak, medical staff worked in high-risk environments, which led to concerns about potential health hazards (7), and, thus, asymptomatic infection. These results indicated that increased attention should be paid to the PTSD symptoms displayed by medical staff and that effective measures should be taken to alleviate these symptoms in the future.

As expected, insomnia severity mediated the effect of perceived stress on PTSD, which confirmed the above hypothesis. In the process of supporting Wuhan against COVID-19, the medical staff faced tremendous pressure in the form of shortage of medical supplies and stress as a result of the lack of effective treatment of the disease at the time (50, 51). During the COVID-19 epidemic, workplace stress for medical staff is an important factor that should be considered as well as other



problems, such as lack of sleep, because perceived stress is a risk factor for the development of sleep issues among frontline medical staff (52, 53). This suggestion applies to the concept of allostasis stress proposed by Sterling and Eye (54). If an individual is under extreme stress for a prolonged period of time, then an allostasis state of mind and body occurs, which is manifested in various forms, such as sleep disorders and excessive emotional arousal. Previous studies reported that COVID-19 reduced the sleep quality of individuals during the epidemic (55), which increases the risk of infection among frontline medical staff due to direct contact with patients with COVID-19 (56). Under such circumstances, frontline medical staff with perceived high levels of stress may experience sleep disorders. In turn, medical staff with poor sleep quality are prone to PTSD-related symptoms (57). Furthermore, sleep problems, such as insomnia and nightmares, are considered common symptoms of PTSD, which suggests that medical staff with poor sleep quality are more vulnerable to PTSD symptoms (58). Thus, the current study proposes that sleep-related problems mediate the relationship between perceived stress and PTSD among frontline medical staff. Relevant studies demonstrated that good sleep quality plays an important role in restoring neurobehavioral function and in alleviating psychological distress, such as depression, stress, and PTSD (59). Therefore, relevant agencies should reset work schedules, promote frequent breaks during work shifts (60), and establish a shift work model that respects the health and wellbeing of medical staff (61). These measures can provide medical staff with a good sleeping environment to enhance immunity, which may reduce stress and PTSD.

The results indicated that compassion fatigue only moderates the association between perceived stress and PTSD. This moderating effect is very significant among medical staff with high levels of compassion fatigue, whereas no moderating effect was observed for medical staff with low levels of compassion fatigue. Individuals with high levels of compassion fatigue will exhibit a state of physical and mental fatigue and reduced pleasure and satisfaction at work, which results in a general decline in energy and ability to help and rescue others (62, 63). Compassion fatigue mainly comes from secondary traumatization, which is different from primary traumatization. It emphasizes on the cumulative effect of stress caused by continuous expression of empathy of frontline medical staff toward COVID-19 patients (64). On the other hand, primary traumatization is defined as a stress response of an individual from directly experiencing a traumatic event. The effect is obvious in a high compassion fatigue state, but in a low level of compassion fatigue state, exhaustion can turn into compassionate satisfaction, the pleasure and satisfying feeling that comes from helping others. During the COVID-19 epidemic, frontline medical staff faced tremendous levels of stress, treated a large number of patients, lacked equipment, had to use unfamiliar equipment, and lacked specific evidence that could be used to guide disease treatment (65). Thus, they were exposed to the risk of developing compassion fatigue, which is conceptualized as a response to indirect exposure to traumatic events. Individuals who reported more severe PTSD symptoms also reported high levels of compassion fatigue (66). According to the compassion

fatigue model (CFM), everyone has their own balance of resources. Frontline medics always facing tremendous pressure from their working environments, if they lack resources to cope with the pressure, they will experience severe personal distress. Once the balance of resources is broken, medical staff will suffer from compassion fatigue and show symptoms of PTSD (67). However, this study did not observe the moderating effect of low levels of compassion fatigue. The reason for this result may be that previous studies observed high levels of compassion in a large proportion of frontline medical staff who participated in the rescue. One study suggested that when medical staff believed in their causes, such as rescuing patients with COVID-19 and saving lives, such positive beliefs and thoughts may have provided them with a sense of accomplishment and satisfaction, which, in turn, eased their fears and provided protection from stressful events that may result in PTSD symptoms (68). Thus, the goal of compassion fatigue research is to help caregivers to build strong psychological resilience to enrich their internal resources, so they can quickly recover from traumatic experiences and maintain efficient and high function work performances (62). Effective strategies to prevent and control compassion fatigue are through internal self-awareness and efficient self-care and management. Health managers should encourage frontline medical staff to recover from compassion fatigue by improve communication skills, self-expression, and self-compassion (69).

The study has several limitations. First, this study was based on a cross-sectional survey. Thus, pinpointing the causal relationships between research variables is impossible. Furthermore, the research was based on a questionnaire. Therefore, the results may be prone to subjectivity and reliability. Lastly, the study only explores the relationship between insomnia severity and compassion fatigue between perceived stress and PTSD. Thus, future research should explore the relationship between other variables.

Despite these limitations, the current study shed light on the relationship between perceived stress and PTSD and emphasized that PTSD among frontline medical workers in the fight against the COVID-19 epidemic largely remains a concern. Moreover, the study confirmed that perceived stress is not only directly related to PTSD but also indirectly related to PTSD through insomnia severity with the moderating role of compassion fatigue on the direct path. Therefore, the study provided reference for the formulation of psychological intervention programs for frontline medical staff affected by PTSD during other similar public health emergencies.

DATA AVAILABILITY STATEMENT

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

AUTHOR CONTRIBUTIONS

SM, YCH, and LL conceived the presented idea. HR, YYH, ZQ, RC, CL, JF, TY, CM, XG, and JL discussed the results and contributed to the final manuscript. All authors contributed to the article and approved the submitted version.

REFERENCES

- Chan JF, Yuan S, Kok KH, To KK, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet*. (2020) 395:514–23. doi: 10.1016/S0140-6736(20)30154-9
- Wang H, Wang S, Yu K. COVID-19 infection epidemic: the medical management strategies in Heilongjiang Province, China. *Crit Care*. (2020) 24:107. doi: 10.1186/s13054-020-2832-8
- Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. (2020) 3:e203976. doi: 10.1001/jamanetworkopen.2020.3976
- Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry*. (2020) 7:e14. doi: 10.1016/S2215-0366(20)30047-X
- Foa EB, Ehlers A, Clark DM, Tolin DF, Orsillo SM. The posttraumatic cognitions inventory (PTCI): development and validation. *Psychol Assess*. (1999) 11:303–14. doi: 10.1037/1040-3590.11.3.303
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5®). *Am Psychiatr Publ*. (2013) 309–334. doi: 10.1176/appi.books.9780890425596
- Carmassi C, Foghi C, Dell'Oste V, Cordone A, Bertelloni CA, Bui E, et al. PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What can we expect after the COVID-19 pandemic. *Psychiatry Res*. (2020) 292:113312. doi: 10.1016/j.psychres.2020.113312
- Song X, Fu W, Liu X, Luo Z, Wang R, Zhou N, et al. Mental health status of medical staff in emergency departments during the Coronavirus disease 2019 epidemic in China. *Brain Behav Immun*. (2020) 88:60–5. doi: 10.1016/j.bbi.2020.06.002
- World Health Organization. *International statistical classification of diseases and related health problems*, 11th ed. Geneva, CH: WHO (2019).
- Lecic-Tosevski D, Vukovic O, Stepanovic J. Stress and personality. *Psychiatriki*. (2011) 22:290–297
- Liu S, Lithopoulos A, Zhang CQ, Garcia-Barrera MA, Rhodes RE. Personality and perceived stress during COVID-19 pandemic: Testing the mediating role of perceived threat and efficacy. *Pers Individ Dif*. (2021) 168:110351. doi: 10.1016/j.paid.2020.110351
- Chen B, Li QX, Zhang H, Zhu JY, Yang X, Wu YH, et al. The psychological impact of COVID-19 outbreak on medical staff and the general public. *Curr Psychol*. (2020) 1–9. doi: 10.21203/rs.3.rs-21213/v1
- Shi J, Chen Y, Li X, An Y. Predicting posttraumatic stress and depression symptoms among frontline firefighters in China. *J Nerv Ment Dis*. (2021) 209:23–7. doi: 10.1097/NMD.0000000000001250
- McKeever VM, Huff ME, JoGP. A diathesis-stress model of posttraumatic stress disorder: Ecological, biological, and residual stress pathways. *Rev Gen Psychol*. (2003) 7:237–250. doi: 10.1037/1089-2680.7.3.237
- Liu D, Liu S, Zhu L, Li D, Huang D, Deng H, et al. Prevalence and related factors of insomnia among Chinese medical staff in the middle and late stage of COVID-19. *Front Psychiatry*. (2020) 11:602315. doi: 10.3389/fpsy.2020.602315
- Zhou Y, Wang W, Sun Y, Qian W, Liu Z, Wang R, et al. The prevalence and risk factors of psychological disturbances of frontline medical staff in China under the COVID-19 epidemic: Workload should be concerned. *J Affect Disord*. (2020) 277:510–4. doi: 10.1016/j.jad.2020.08.059
- Wang H, Huang D, Huang H, Zhang J, Guo L, Liu Y, et al. The psychological impact of COVID-19 pandemic on medical staff in Guangdong, China: a cross-sectional study. *Psychol Med*. (2020) 1–9. doi: 10.1017/S0033291720002561
- Otsuka Y, Kaneita Y, Itani O, Nakagome S, Jike M, Ohida T. Relationship between stress coping and sleep disorders among the general Japanese population: a nationwide representative survey. *Sleep Med*. (2017) 37:38–45. doi: 10.1016/j.sleep.2017.06.007
- Tachibana H, Izumi T, Honda S, Takemoto TI. The prevalence and pattern of insomnia in Japanese industrial workers: relationship between psychosocial stress and type of insomnia. *Psychiatry Clin Neurosci*. (1998) 52:397–402. doi: 10.1046/j.1440-1819.1998.00407.x
- Germain A. Sleep disturbances as the hallmark of PTSD: where are we now? *Am J Psychiatry*. (2013) 170:372–82. doi: 10.1176/appi.ajp.2012.12040432
- Wang J, Okoli CTC, He H, Feng F, Li J, Zhuang L, et al. Factors associated with compassion satisfaction, burnout, and secondary traumatic stress among Chinese nurses in tertiary hospitals: A cross-sectional study. *Int J Nurs Stud*. (2020) 102:103472. doi: 10.1016/j.ijnurstu.2019.103472
- Deering DJ, JoPN, Services MH. Compassion fatigue: coping with secondary traumatic stress disorder in those who treat the traumatized. *J Psychosoc Nurs Ment Health Serv*. (1996) 34:52. doi: 10.3928/0279-3695-19961101-26
- Frankfurt S, Frazier P. A review of research on moral injury in combat veterans. *Military Psychology*. (2016) 28:318–30. doi: 10.1037/mil0000132
- Alharbi J, Jackson D, Usher K. The potential for COVID-19 to contribute to compassion fatigue in critical care nurses. *J Clin Nurs*. (2020) 29:2762–4. doi: 10.1111/jocn.15314
- Coetzee SK, Kloppe HC. Compassion fatigue within nursing practice: A concept analysis. *Nurs Health Sci*. (2010) 12:235–43. doi: 10.1111/j.1442-2018.2010.00526.x
- Sabo BJO, Jolin N. Reflecting on the concept of compassion fatigue. *Online J Issues Nurs*. (2011) 16 (1):1. doi: 10.3912/OJIN.Vol16No01Man01
- Radey M, Figley CR. The social psychology of compassion. *Clin Soc Work J*. (2007) 35:207–14. doi: 10.1007/s10615-007-0087-3
- Ariapooran S. Compassion fatigue and burnout in Iranian nurses: The role of perceived social support. *Iran J Nurs Midwifery Res*. (2014) 19:279–284
- Hobfoll SE. The influence of culture, community, and the nested-self in the stress process: Advancing Conservation of Resources theory. *Appl Psychol-Int Rev-Psychol Appl-Rev Int*. (2001) 50:337–70. doi: 10.1111/1464-0597.00062
- Weathers FW, Litz BT, Herman DS, Husha JA, Keane TM. The PTSD checklist: reliability, validity, and diagnostic utility. *Int Soc Trauma Stress Stud*. (1993) 2:90–2.
- Metregiste D, Boucaud-Maitre D, Aubert L, Noubou L, Jehel L. Explanatory factors of post-traumatic distress and burnout among hospital staff 6 months after Hurricane Irma in Saint-Martin and Saint-Barthelemy. *PLoS ONE*. (2020) 15:e0229246. doi: 10.1371/journal.pone.0229246
- Tang W, Hu T, Yang L, Xu J. The role of alexithymia in the mental health problems of home-quarantined university students during the COVID-19 pandemic in China. *Pers Individ Dif*. (2020) 165:110131. doi: 10.1016/j.paid.2020.110131
- Tang L, Pan L, Yuan L, Zha L. Prevalence and related factors of post-traumatic stress disorder among medical staff members exposed to H7N9 patients. *Int J Nurs Sci*. (2017) 4:63–7. doi: 10.1016/j.ijnss.2016.12.002
- Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. (1983) 24:385–396. doi: 10.2307/2136404
- Song Y, Yang F, Sznajder K, Yang X. Sleep quality as a mediator in the relationship between perceived stress and job burnout among Chinese nurses: a structural equation modeling analysis. *Front Psychiatry*. (2020) 11:566196. doi: 10.3389/fpsy.2020.566196
- Morin CM, Belleville G, Bélanger L, Ivers H. The Insomnia Severity Index: psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep*. (2011) 34:601–8. doi: 10.1093/sleep/34.5.601
- Sagherian K, Steege LM, Cobb SJ, Cho H. Insomnia, fatigue and psychosocial well-being during COVID-19 pandemic: A cross-sectional survey of hospital nursing staff in the United States. *J Clin Nurs*. (2020). doi: 10.1111/jocn.15566. [Epub ahead of print].
- Agberotimi SF, Akinsola OS, Oguntayo R, Olaseni AO. Interactions between socioeconomic status and mental health outcomes in the Nigerian context amid COVID-19 pandemic: a comparative study. *Front Psychol*. (2020) 11:559819. doi: 10.3389/fpsy.2020.559819
- Adams RE, Boscarino JA, Figley CR. Compassion fatigue and psychological distress among social workers: a validation study. *Am J Orthopsychiatry*. (2006) 76:103–8. doi: 10.1037/0002-9432.76.1.103
- Sun B, Hu M, Yu S, Jiang Y, Lou B. Validation of the compassion fatigue short scale among Chinese medical workers and firefighters: a cross-sectional study. *BMJ Open*. (2016) 6:e011279. doi: 10.1136/bmjopen-2016-011279
- Cao X, Chen L. The impact of resilience on turnover intention in dialysis nurses: The mediating effects of work engagement and compassion fatigue. *Jpn J Nurs Sci*. (2021). doi: 10.1111/jjns.12414

42. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol.* (1986) 51:1173–82. doi: 10.1037/0022-3514.51.6.1173
43. Serrano-Ripoll MJ, Meneses-Echavez JF, Ricci-Cabello I, Fraile-Navarro D, Fiol-deRoque MA, Pastor-Moreno G, et al. Impact of viral epidemic outbreaks on mental health of healthcare workers: a rapid systematic review and meta-analysis. *J Affect Disord.* (2020) 277:347–357. doi: 10.1016/j.jad.2020.08.034
44. Sun L, Sun Z, Wu L, Zhu Z, Zhang F, Shang Z, et al. Prevalence and risk factors for acute posttraumatic stress disorder during the COVID-19 outbreak. *J Affect Disord.* (2021) 283:123–9. doi: 10.1016/j.jad.2021.01.050
45. Shek DTL, Zhao L, Dou D, Zhu X, Xiao C. The impact of positive youth development attributes on posttraumatic stress disorder symptoms among Chinese adolescents under COVID-19. *J Adolesc Health.* (2021) 68:676–82. doi: 10.1016/j.jadohealth.2021.01.011
46. Dai W, Chen L, Lai Z, Li Y, Wang J, Liu A. The incidence of post-traumatic stress disorder among survivors after earthquakes: a systematic review and meta-analysis. *BMC Psychiatry.* (2016) 16:188. doi: 10.1186/s12888-016-0891-9
47. Bassi M, Negri L, Delle Fave A, Accardi R. The relationship between post-traumatic stress and positive mental health symptoms among health workers during COVID-19 pandemic in Lombardy, Italy. *J Affect Disord.* (2021) 280:1–6. doi: 10.1016/j.jad.2020.11.065
48. Du B, Ma X, Ou X, Jin Y, Ren P, Li J. The prevalence of posttraumatic stress in adolescents eight years after the Wenchuan earthquake. *Psychiatry Res.* (2018) 262:262–9. doi: 10.1016/j.psychres.2018.02.019
49. Neitzke AB. An illness of power: gender and the social causes of depression. *Cult Med Psychiatry.* (2016) 40:59–73. doi: 10.1007/s11013-015-9466-3
50. Salari N, Khazaie H, Hosseini-Far A, Khaledi-Paveh B, Kazemini M, Mohammadi M, et al. The prevalence of stress, anxiety and depression within front-line healthcare workers caring for COVID-19 patients: a systematic review and meta-regression. *Hum Resour Health.* (2020) 18:100. doi: 10.1186/s12960-020-00544-1
51. Pan A, Liu L, Wang C, Guo H, Hao X, Wang Q, et al. Association of public health interventions with the epidemiology of the COVID-19 outbreak in Wuhan, China. *Jama.* (2020) 323:1915–23. doi: 10.1001/jama.2020.6130
52. Drake CL, Roehrs T, Roth T. Insomnia causes, consequences, and therapeutics: an overview. *Depress Anxiety.* (2003) 18:163–76. doi: 10.1002/da.10151
53. Karabulut N, Gürçayir D, Yaman Aktaş Y, Kara A, Kiziloglu B, Arslan B, et al. The effect of perceived stress on anxiety and sleep quality among healthcare professionals in intensive care units during the coronavirus pandemic. *Psychol Health Med.* (2021) 26:119–30. doi: 10.1080/13548506.2020.1856897
54. Fisher S., Reason J, editors. *Handbook of Life Stress, Cognition and Health.* J. Wiley Ltd. (1988) p. 631
55. Xiao H, Zhang Y, Kong D, Li S, Yang N. The effects of social support on sleep quality of medical staff treating patients with coronavirus disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci Monit.* (2020) 26:e923549. doi: 10.12659/MSM.923549
56. Demartini B, Nisticò V, D'Agostino A, Priori A, Gambini O. Early psychiatric impact of covid-19 pandemic on the general population and healthcare workers in Italy: a preliminary study. *Front Psychiatry.* (2020) 11:561345. doi: 10.3389/fpsy.2020.561345
57. Yin Q, Sun Z, Liu T, Ni X, Deng X, Jia Y, et al. Posttraumatic stress symptoms of health care workers during the corona virus disease 2019. *Clin Psychol Psychother.* (2020) 27:384–95. doi: 10.1002/cp.p.2477
58. Taylor DJ, Pruiksma KE, Hale W, McLean CP, Zandberg LJ, Brown L, et al. Sleep problems in active duty military personnel seeking treatment for posttraumatic stress disorder: presence, change, and impact on outcomes. *Sleep.* (2020) 43. doi: 10.1093/sleep/zsaa065
59. Baglioni C, Spiegelhalder K, Lombardo C, Riemann D. Sleep and emotions: a focus on insomnia. *Sleep Med Rev.* (2010) 14:227–38. doi: 10.1016/j.smrv.2009.10.007
60. Caruso CC. Negative impacts of shiftwork and long work hours. *Rehabil Nurs.* (2014) 39:16–25. doi: 10.1002/rnj.107
61. Ferri P, Guadi M, Marcheselli L, Balduzzi S, Magnani D, Di Lorenzo R. The impact of shift work on the psychological and physical health of nurses in a general hospital: a comparison between rotating night shifts and day shifts. *Risk Manag Healthc Policy.* (2016) 9:203–11. doi: 10.2147/RMHP.S115326
62. Cocker F, Joss N. Compassion Fatigue among Healthcare, Emergency and Community Service Workers: A Systematic Review. *Int J Environ Res Public Health.* (2016) 13. doi: 10.3390/ijerph13060618
63. Mathieu F. Running on empty: compassion fatigue in health professionals. *Rehab Community Care Med.* (2007) 4:1–7.
64. Figley CR. The politics of readjustment - Vietnam veterans since the war - Scott, WJ. *J Trauma Stress.* (1995) 8:194–6. doi: 10.1002/jts.2490080118
65. Bell V, Wade D. Mental health of clinical staff working in high-risk epidemic and pandemic health emergencies a rapid review of the evidence and living meta-analysis. *Soc Psychiatry Psychiatr Epidemiol.* (2020) 1–11. doi: 10.1007/s00127-020-01990-x
66. Tominaga Y, Goto T, Shelby J, Oshio A, Nishi D, Takahashi S. Secondary trauma and posttraumatic growth among mental health clinicians involved in disaster relief activities following the 2011 Tohoku earthquake and tsunami in Japan. *Couns Psychol Q.* (2020) 33:427–47. doi: 10.1080/09515070.2019.1639493
67. Coetzee SK, Laschinger HKS. Toward a comprehensive, theoretical model of compassion fatigue: An integrative literature review. *Nurs Health Sci.* (2018) 20:4–15. doi: 10.1111/nhs.12387
68. Dosil M, Ozamiz-Etxebarria N, Redondo I, Picaza M, Jaureguizar J. Psychological symptoms in health professionals in Spain after the first wave of the covid-19 pandemic. *Front Psychol.* (2020) 11:606121. doi: 10.3389/fpsyg.2020.606121
69. Lee M, Laurensen M, Whitfield C. Can compassion be taught to lessen the effects of compassion fatigue? *J Care Serv Manag.* (2012) 6:121–30. doi: 10.1179/1750168713Y.0000000016

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Effect of EAP Psychological Intervention on Improving the Mental Health of Medical Workers Under the Novel Coronavirus Epidemic in China

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OPEN ACCESS

Edited by:

Elizabeth Mary Westrupp,
Deakin University, Australia

Reviewed by:

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Attridge Consulting, Inc.,
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Runtang Meng,
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Specialty section:

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

Received: 04 January 2021

Accepted: 21 June 2021

Published: 28 July 2021

Citation:

Xu J, Liu X, Xiao Y, Fang X, Cheng Y
and Zhang J (2021) Effect of EAP
Psychological Intervention on
Improving the Mental Health of
Medical Workers Under the Novel
Coronavirus Epidemic in China.
Front. Public Health 9:649157.
doi: 10.3389/fpubh.2021.649157

Background: Due to the novel coronavirus epidemic, medical workers are under immense psychological pressure. As such, the East Campus of Shanghai Sixth People's Hospital actively adopted the Symptoms Checklist 90 (SCL-90) to evaluate the mental health of hospital staff before and after the psychological intervention from the Employee Assistance Program (EAP).

Methods: Medical workers from the East Campus of Shanghai Sixth People's Hospital were recruited for this study. Psychological evaluations were conducted using the SCL-90, with a score of >160 regarded as a positive result, or in other words, an indication of abnormal psychological symptoms. The EAP adopted different forms of psychological interventions for healthcare professionals, and participation in these measures was entirely voluntary. Medical workers completed the SCL-90 again after participating in the psychological intervention, and we analyzed the changes between their two assessments.

Results: Of the 1,198 total medical staff present at the hospital, 844 participated in the initial survey, while only 652 completed the survey a second time (i.e., post-psychological intervention). Multivariate logistic regression analysis found that the psychological status of hospital staff was correlated with gender, education background, and fertility status ($P < 0.05$). The results showed that, compared with women, men's mental health status was better, with an OR value of 0.598 (0.372–0.962). Groups with high school, junior high school, and below education levels were at higher risk of psychological problems, with OR values of 23.655 (2.815–198.784) and 9.09 (2.601–31.801), respectively. Administrative occupations and having two or more children were protective factors for mental health, and the OR values were 0.400 (0.175–0.912) and 0.327 (0.152–0.703), respectively.

Following the psychological intervention, we found that the mental health of hospital workers improved, as indicated by their second SCL-90 evaluations, although the proportion of medical staff willing to participate in the second evaluation was lower than the initial assessment. There were differences in the SCL-90 scores among different occupations, and there were also differences in the scores of employees of different occupations who had participated in the two evaluations. The employees of different

positions who participated in the two evaluations were matched and analyzed and found that the depression and anxiety of the doctor group were significantly reduced. In the nursing group, the total score, somatization, interpersonal sensitivity, depression, and anxiety were significantly reduced. In the medical technician group, depression, anxiety, and paranoia were reduced considerably. Among office staff, no significant differences were found. Among workers, the total score, depression, and anxiety were significantly reduced.

Conclusion: Hospitals have the potential to alleviate and reduce the psychological pressure placed on medical staff members through the EAP, which can actively adopt intervention and guidance measures. The findings of this study have important implications, as reducing abnormal psychological symptoms of healthcare professionals can be helpful in the fight against the coronavirus epidemic.

Keywords: novel coronavirus, employee assistance program, EAP psychological intervention, SCL-90 psychological evaluation, medical workers, psychological changes

INTRODUCTION

In December 2019, the novel coronavirus outbreak occurred in China, and the virus has now been listed as a first-level medical prevention and control event at the national level (1). The World Health Organization (WHO) named the virus “novel coronavirus,” that is, CoV-2019. The pathogen is primarily transmitted by respiratory droplets and is highly contagious (2). Infection rates are increasing exponentially worldwide, and the mortality rate is high in some countries. However, the virus was well-controlled in China because public health authorities responded promptly, implementing strict control measures throughout the country (3). Previously, China has faced outbreaks of severe acute respiratory syndrome (SARS) and bird flu, which led to psychological disorders in a large number of people (4). Thus, given previous experience in managing severe disease outbreaks such as SARS (3), China has prioritized mental health counseling from the beginning of the novel coronavirus epidemic. Early on in the disease outbreak, when the numbers of confirmed cases and deaths were increasing, many members of the public (5), especially medical staff, experienced psychological symptoms such as anxiety and tension (6). If mental health challenges like these are not efficiently resolved, severe mental illness may develop, affecting productivity and safety in the workplace.

The East Campus of Shanghai Sixth People's Hospital, as the only third-level hospital in the Nanhui area, has assisted in diagnosing, investigating, and isolating the novel coronavirus infections in the Pudong area since the beginning of the epidemic. Under these circumstances, the medical staff faced tremendous physical and psychological pressure, giving rise to mental health issues. During the early stage of the epidemic, the Trade Union department of the hospital considered the psychological challenges employees were facing and launched the Employee Assistance Program (EAP), which includes different forms of psychological intervention (7). The EAP is a systematic and long-term assistance and welfare program for employees.

Through the program, mental health professionals diagnose individual employees, advise the hospital organization, and provide professional guidance, training, and consultation.

In this study, we used the Symptom Checklist 90 (SCL-90) to evaluate the psychological well-being of hospital staff members (8). The SCL-90 is one of the most well-known mental health test scales in the world (9) and measures nine aspects of psychological well-being. Next, we analyzed the psychological changes of employees during different periods of the epidemic. We also carried out a unified analysis of staff members with higher SCL-90 scores to assess the epidemic's effects on individuals with mental illnesses.

The Hospital Trade Union considered the psychological state of medical staff members based on their SCL-90 scores and, according to severity, adopted different forms of psychological interventions. For staff members with SCL-90 scores indicating severe mental illness, the EAP intervened individually through effective professional psychological counseling measures, including small class videos and WeChat public classes. We then analyzed changes in the employees' psychological states before and after the EAP psychological intervention and further explored the psychological impacts of the epidemic on healthcare professionals.

RESEARCH METHODS

Ethics

This study was approved by the Ethics Committee of the Eastern Campus of the Sixth People's Hospital of Shanghai, with ethics approval No. 201807-11. All participants provided informed consent before taking the survey.

Subjects

The inclusion criteria were: ① the staff at our hospital ② who consented to questionnaires and psychological intervention. A total of 1,198 medical workers were included in this study

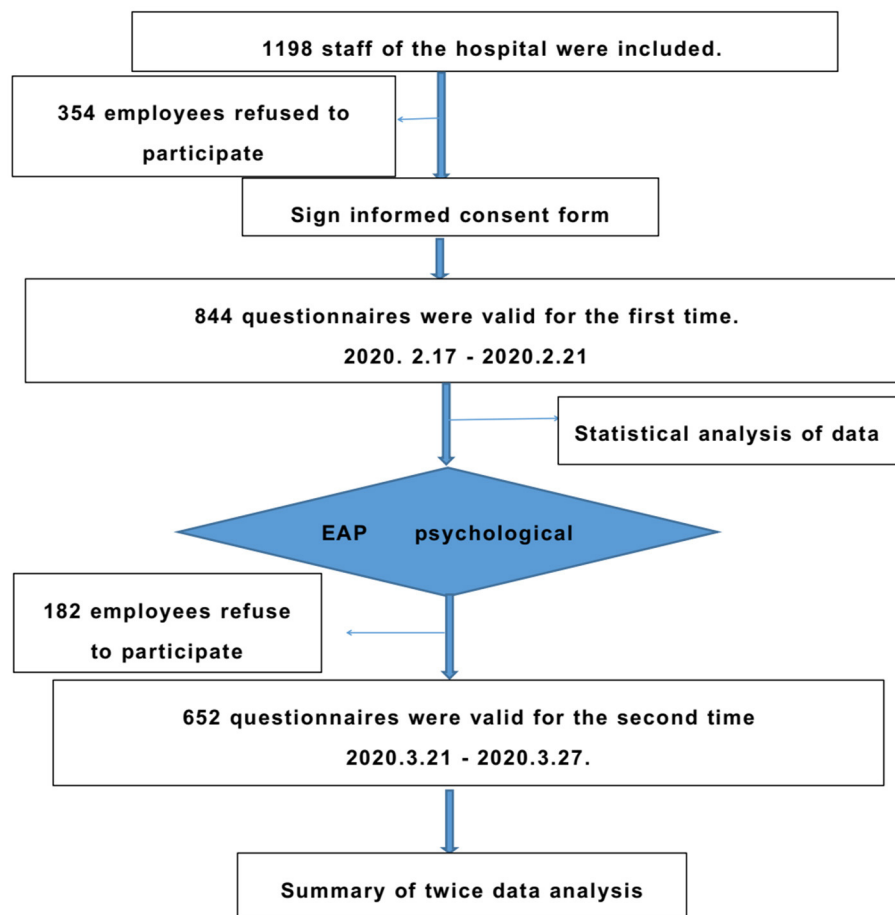


FIGURE 1 | Research design flowchart.

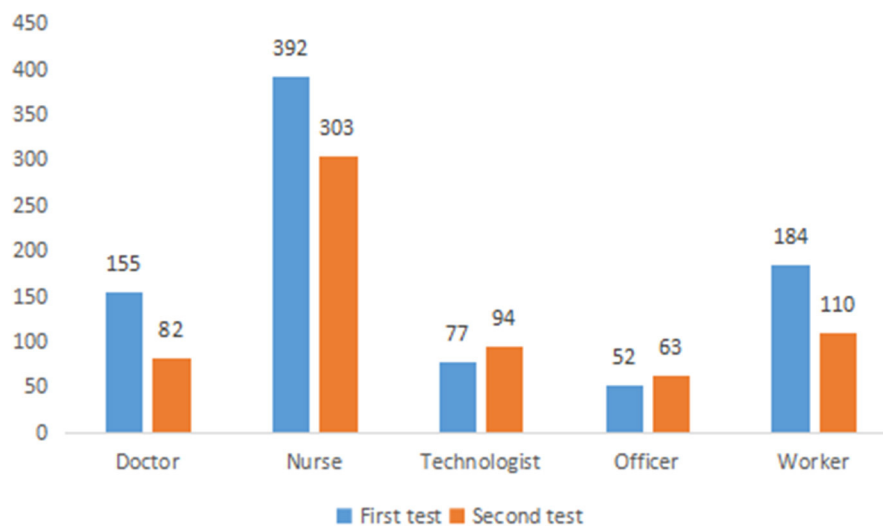


FIGURE 2 | Comparison of the number of people in different majors participating in the two assessment.

TABLE 1 | Validity and reliability of the SCL-90 questionnaire.

Item	Somatization	Obsessive compulsive	Interpersonal sensitivity	Depression	Anxiety	Hostile	Terror	Paranoia	Psychosis
Whole sample (n = 844)									
Cronbach alpha coefficient	0.83	0.81	0.89	0.81	0.80	0.73	0.79	0.78	0.80
Test-retest correlateion	0.86	0.83	0.77	0.93	0.84	0.78	0.80	0.89	0.77
Correlation with whole score	0.82	0.88	0.80	0.85	0.85	0.79	0.82	0.85	0.82

from the hospital. All questionnaires were reported online by voluntary participation.

Study Design

This study used interventional clinical observation and psychological evaluation before and after the intervention. The study design flow chart is shown in **Figure 1**.

Psychological Evaluation

Psychological well-being was evaluated by the SCL-90, which includes nine factors (8): somatization, interpersonal sensitivity, obsessive-compulsive symptoms, anxiety, depression, hostility, paranoia, terror, and psychosis. The test quantifies the psychological status of individuals in the last week through a five-point Likert scale (8), with higher scores indicating more severe mental health symptoms: 1 = none, 2 = very light, 3 = moderate, 4 = heavy, and 5 = serious. The number of positive items in the SCL-90 is >43, and the score of any one of these items is >2 points. A score of >160 points is considered a positive score, while a total score of >200 points indicates obvious psychological problems. A total score of >250 points indicates that psychological help is needed immediately.

The SCL-90 Questionnaire

The SCL-90 questionnaire was prepared for this study through the <https://www.wjx.cn/> website and its reliability and validity are analyzed. Based on a literature search (10) and expert consultation, a general questionnaire was created based on specific circumstances due to the epidemic that may affect the psychological well-being of hospital workers. In addition to specific questions related to the psychological status, the survey also asked about a healthcare worker's age, sex, education, length of service, professional title, position, type of post, number of siblings, marital status, fertility, parents, and previous first-line work experience with an epidemic (such as SARS). According to the degree of close contact with COVID-19 patients, positions were divided into seven types: aid to Hubei, the Shanghai Public Health Center, the fever clinic, internal medicine, surgery, pediatrics, and the emergency department. Hospital staff members answered the survey questions by scanning the QR code for 5 days; the platform's link was closed on the sixth day to collect the data. The contents of the questionnaires in the subsequent follow-up were the same.

EAP Psychological Intervention

We analyzed and summarized the data from employees whose SCL-90 score was >160, and especially those with scores

>200. The total symptom index was ≥ 2 , and the number of positive items was ≥ 43 . Since employee participation was completely voluntary and privacy was ensured, the hospital union adopted the EAP psychological assistance program to provide group intervention or individual intervention as follows (1) For individuals with a total score of >250, the hospital adopted a one-on-one psychological counseling service to provide a personal intervention with strict privacy. (2) The hotline was accessible to provide psychological assistance for public welfare (hotline: 021-64376570, 021-34141539, available Monday–Friday, 9:00–22:00). (3) The hospital organized different resources: a free EAP psychological website, psychological training, counseling through a series of micro-courses (once or twice a week for 15 min each), and WeChat meetings (conducted in small groups).

Statistical Analysis

The data were analyzed by SPSS 22.0, the counting data were expressed as a percentage, and the measurement data were expressed as $\bar{x} \pm s$. Chi-square test, *t*-test, U test, Welch's test, and the Brown–Forsythe test were used for comparison between groups. A multinomial logistic regression model was used for multivariate analysis. $P < 0.05$ indicated that the difference was statistically significant.

RESULTS

Baseline Information

The first questionnaire was distributed from February 17–21, 2020. The second questionnaire was distributed from March 21–27, 2020. Regarding the initial assessment, a total of 844(70.5%) valid questionnaires were collected, which included 155 doctors (18.02%), 392 nurses (45.58%), 77 personnel with medical skills (8.95%), 52 administrative staff members (6.05%), and 184 other hospital workers (21.4%). Regarding the second evaluation, 652(54.4%) valid questionnaires were collected, including 82 doctors (12.58%), 303 nurses (46.47%), 94 personnel with medical skills (14.42%), 63 administrative staff members (9.66%), and 110 other hospital workers (16.87%). Thus, the participation of doctors and other hospital workers decreased, while that of the technical staff increased. See **Figure 2**. Reliability and Validity **Table 1** shows the SCL-90 questionnaire reliability and validity.

TABLE 2 | Basic situation of the subjects of the two surveys [total number of people (positive number > 160 points)].

	Group	Frist research (<i>n</i> = 844)	χ^2	<i>P</i> -value	Second research (<i>n</i> = 652)(<i>n</i> , %)	χ^2	<i>P</i> -values
Sex	Male	202 (23,11%)	7.889	0.005	126 (11,8%)	8.911	0.005
	Female	642 (129,20%)			526 (102,19%)		
Age (years)	29	248 (36,14%)	18.496	0.001	143 (25,17%)	2.153	0.074
	30–39	376 (91,24%)			353 (70,19%)		
	40–49	133 (16,12%)			102 (12,11%)		
	≥50	87 (9,10%)			54 (6,11%)		
Length of service	10	463 (86,18%)	2.022	0.364	366 (62,16%)	1.206	0.193
	10–19	220 (43,19%)			178 (35,19%)		
	20–29	101 (15,14%)			66 (7,10%)		
	≥30	60 (8,13%)			42 (9,21%)		
Professional position	Doctor	154 (24,15%)	38.794	0.001	82 (13,15%)	29.891	0.001
	Nurse	387 (99,25%)			303 (72,23%)		
	Technologist	77(10,12%)			94 (6,6%)		
	Office	51 (11,21%)			63 (16,25%)		
	Worker	175 (8,4%)			110 (6,5%)		
Post	Aid Hubei	4 (4,100%)		0.001	4 (2,50%)	24.516	0.004
	Aid PHC	4 (4,100%)			4 (1,25%)		
	Fever Clinic	24 (20,83%)			24 (18,75%)		
	Other post	812 (124,15%)			620 (191,30%)		
Degree	Doctor	28 (4,14%)	28.580	0.001	23 (3,13%)	39.845	0.001
	Master	137 (24,17%)			98 (20,20%)		
	Bachelor	348 (80,22%)			300 (61,20%)		
	College	192 (40,20%)			25 (5,20%)		
	Senior	139 (4,2%)			93 (4,4%)		
Professional title	Senior	65 (11,16%)	13.278	0.008	38 (5,12%)	42.689	0.006
	Intermediate	117 (25,21%)			87 (22,25%)		
	Junior	431 (92,21%)			365 (69,18%)		
	No	231 (24,9.8%)			162 (17,10%)		
Marital status	No	171 (121,70%)	46.577	0.001	508 (89,17%)	1.203	0.401
	Yes	649 (27,3%)			126 (19,15%)		
	Divorce	24 (4,16%)			18 (5,27%)		
Only one kid	Yes	373 (77,20%)	3.140	0.076	294 (61,20%)	5.265	0.037
	No	471 (75,15%)			358 (52,14%)		
Fertility situation	No	240 (36,15%)	73.929	0.499	185 (26,14%)	52.415	0.230
	One kid	476 (86,18%)			372 (66,17%)		
	Two or more	128 (30,23%)			95 (21,22%)		
Parents' situation	Parents	701 (128,18%)	0.173	0.675	544 (100,18%)	0.215	0.112
	Single family	143 (24,16%)			108 (13,12%)		
Joining SARS	Yes	90 (17,18%)	0.053	0.843	100 (19,19%)	0.078	0.632
	No	754 (136,18%)			552 (94,17%)		

Univariate Analysis of Related Factors of Employees With Abnormal Total Scores From the SCL-90 Assessment of Survey 1

The distribution of the total scores of all hospital workers participating in the survey 1 was > 160 points, as well as the specific basic situation analysis. The basic situation analysis is shown in **Table 2**. In terms of gender, the abnormal psychological symptoms rate of female employees was significantly higher than that of male employees ($P = 0.005$). Also, we found a

significant difference when considering age: the highest rate of psychological abnormality was found in employees between 30 and 39 years old ($P < 0.001$). In addition, SCL-90 scores differed significantly based on occupation in the hospital ($P < 0.001$), with the abnormal psychological symptoms rate of nurses being the highest. Considering the first evaluation, the positive rate (i.e., an SCL-90 score of > 160) of medical staff working in Hubei and supporting public health centers was 100%, which was significantly alleviated after EAP intervention. The

TABLE 3 | Logistic regression analysis variable assignment.

Variable	Assignment
Mental health status	Positive symptoms=1; Normal=0
Age	<30 years old = 1; 30–39 years old = 2; 40–49 years old = 3; ≥50 years old = 4
Gender	Female = 1; Male = 2
Length of service	<10 years = 1; 10–19 years = 2; 20–29 years = 3; ≥30 years = 4
Occupation	Doctor = 1; Nurse = 2; Medical technician = 3; Office staff = 4; Worker = 5
Educational background	Master's degree and above = 1; Bachelor's degree = 2; Associate degree = 3; High school = 4; Junior high school and below = 5
Professional title	Advanced = 1; Intermediate = 2; Primary = 3; None = 4
Marital status	Married = 1; Unmarried = 2; Divorced or other = 3
Whether the only child	Yes = 1; No = 2
Fertility status	No childbearing = 1; One child = 2; Two children and more = 3
Parent status	Both parents = 1; Single parent or others = 2
Whether there is a major epidemic first-line work experience	Yes = 1; No = 2

abnormal psychological symptoms rate of workers in the fever clinic was still high, and a significant correlation was established between posts and scores ($P < 0.001$). There were also significant differences between the test in terms of academic degrees ($P < 0.001$) and professional titles ($P = 0.008$); individuals with intermediate titles scored the highest. In terms of marriage, the abnormal psychological symptoms rate for unmarried employees was the highest after the first evaluation ($P < 0.001$).

Multivariate Logistic Regression Analysis of Influencing Factors of Psychological Status

Taking mental health status as the dependent variable (a total score of more than 160 points is a positive mental health symptom), age, gender, length of service, occupation, education, professional title, marital status, whether an only child, fertility status, parent status, and whether there is experience working first-line in a major epidemic as independent variables, multivariate logistic regression analysis was performed, and the variable assignments are shown in **Table 3**. Multivariate logistic regression analysis found that the psychological state of hospital staff was correlated with gender, education, and fertility ($P < 0.05$). The results showed that compared with women, men's mental health status was better, with an OR value of 0.598 (0.372–0.962). Groups with high school education levels, junior high school, or below were at higher risk of psychological problems, with OR values of 23.655 (2.815–198.784) and 9.09 (2.601–31.801), respectively. Administrative occupations and having two or more children were protective factors for mental health, and the OR values were 0.400 (0.175–0.912) and 0.327 (0.152–0.703), respectively (**Table 4**).

EAP Psychological Intervention Service

The scores of the two evaluations are shown in **Table 5**. Employees with a score of > 250 in their initial psychological assessment consisted of three doctors, eight nurses, one

office worker, and one medical technologist. Voluntary one-on-one assistance was offered to these 13 people. The counseling meeting was held twice for a small group of < 15 individuals, while hospital-wide counseling was held only once. Psychological counseling via telephone was open indefinitely. After the first evaluation, a total of 11 individuals participated in the individual evaluation, 22 participated in small-scale psychological counseling, 30 participated in voluntary telephone counseling, and 680 participated in WeChat and network counseling. After the second evaluation, 10 personnel, including 2 doctors and 8 nurses, presented a score of > 250 . The two doctors were among three that were evaluated for the first time. Eight nurses were new (first assessment score was 201–250). The scores of employees participating in different intervention methods were compared and analyzed, as shown in **Table 6**. After one-to-one counseling, total score of SCL-90, Obsessive compulsive, Depression, Anxiety, Terror were significantly decreased ($P < 0.05$). After small group consultation, total score of SCL-90, Obsessive compulsive, Depression, and Anxiety were significantly decreased ($P < 0.05$). After telephone consultation, the total score of SCL-90, Depression and Anxiety were significantly decreased ($P < 0.05$). Obsessive compulsive, Depression, and Anxiety decreased significantly after WeChat or online counseling ($P < 0.05$).

Comparative Analysis of the SCL-90 Scores Between Different Professional Occupations

For data that were not in accordance with the homogeneity of variance, a comparison of average scores of the SCL-90 factors in different professional positions (**Table 7**) was conducted through a Welch's test. The results showed that the total scores of workers in various positions differed significantly after two evaluations, and we observed a downward trend with statistical significance among the groups ($P < 0.01$). Moreover, differences were noted in somatization, obsessive-compulsive symptoms, interpersonal

TABLE 4 | Logistic multivariate analysis of factors affecting the mental health of hospital staff.

Factor	β	S.E.	Wald χ^2	P value	OR	(95%CI)	Tolerance	VIF
Gender	-0.514	0.243	4.489	0.034	0.598	0.372–0.962	0.308	3.247
Age (year)								
<30 (reference)								
30~	-0.344	0.255	1.819	0.177	0.709	0.430–1.169	0.421	2.375
40~	0.752	0.575	1.708	0.191	2.121	0.867–6.554	0.236	4.237
≥ 50	0.108	0.779	0.019	0.889	1.114	0.242–5.128	0.125	8
Length of service (year)								
<10 (reference)								
10~	0.341	0.236	2.096	0.148	1.407	0.886–2.232	0.352	2.84
20~	-1.010	0.567	3.175	0.075	0.364	0.120–1.106	0.251	3.984
≥ 30	-0.091	0.394	0.053	0.818	0.913	0.422–1.975	0.260	3.846
Occupation								
Doctor (reference)								
Nurse	-0.708	0.420	2.841	0.092	0.493	0.216–1.122	0.365	2.74
Medical technician	-0.248	0.423	0.344	0.558	0.780	0.341–1.787	0.524	1.908
Office staff	-0.916	0.420	4.749	0.029	0.400	0.175–0.912	0.700	1.429
Worker	-0.021	0.599	0.001	0.973	0.980	0.303–3.617	0.254	3.937
Educational background								
Master's degree and above (reference)								
Bachelor's degree	-0.013	0.262	0.003	0.959	0.987	0.590–1.649	0.652	1.534
Associate degree	0.009	0.306	0.001	0.978	1.009	0.554–1.836	0.520	1.923
High school	3.164	1.086	8.485	0.004	23.655	2.815–198.784	0.321	3.115
Junior high school and below	2.208	0.639	11.948	0.001	9.095	2.601–31.801	0.562	1.78
Professional title								
Advanced (reference)								
Intermediate	-0.346	0.474	0.534	0.465	0.708	0.280–1.790	0.454	2.203
Primary	-0.358	0.496	0.522	0.470	0.699	0.264–1.847	0.285	3.509
None	-0.192	0.544	0.124	0.725	0.826	0.284–2.399	0.641	1.56
Marital status								
Married (reference)								
Unmarried	-0.095	0.370	0.065	0.798	0.910	0.440–1.879	0.785	1.274
Divorced or other	-0.288	0.506	0.324	0.569	0.750	0.278–2.021	0.491	2.037
Whether the only child	0.190	0.179	1.126	0.289	1.209	0.851–1.719	0.454	2.202
Fertility status								
No childbearing (reference)								
One child	-0.548	0.333	2.710	0.100	0.578	0.301–1.110	0.235	4.255
Two children and more	-1.118	0.390	8.206	0.004	0.327	0.152–0.703	0.641	1.56
Parent status	-0.275	0.252	1.192	0.275	0.760	0.464–1.244	0.295	3.39
Whether there is a major epidemic first-line work experience	-0.045	0.272	0.027	0.869	0.956	0.561–1.629	0.215	4.651

sensitivity, depression, anxiety, hostility, phobia, paranoia, and psychosis among the different categories of personnel ($P < 0.01$). After EAP training, we re-analyzed the paired scores of employees of different occupations who participated in the two evaluations, as shown in **Table 8**. This paired analysis showed that the depression and anxiety of the doctor group were significantly reduced. In the nursing group, the total score, somatization, interpersonal sensitivity, depression, and anxiety were significantly reduced. In the medical technician group, depression, anxiety, and paranoia were significantly reduced. Among office staff, no significant differences were

found. Among workers, the total score, depression, and anxiety were significantly reduced.

DISCUSSION

This study evaluated hospital staff members undertaking the crucial medical tasks surrounding the novel coronavirus. The cohort study and analysis revealed psychological changes of hospital employees in different epidemic periods. The SCL-90 scores of some posts were higher than that of others,

TABLE 5 | Total SCL-90 score distribution of healthcare professionals.

		Doctor	Nurse	Office	Technologist	Worker	Total
>250	First	3	8	1	1	0	13
	Second	2	8	0	0	0	10
201–250	First	7	15	3	2	2	29
	Second	3	14	4	1	2	24
160–200	First	17	53	7	7	6	90
	Second	9	51	11	5	4	80
<160	First	128	291	41	67	176	603
	Second	68	230	47	88	104	537

TABLE 6 | Comparison of $M \pm SD$ scores of employees in different positions after the intervention.

	Total scores	Somatization	Obsessive compulsive	Interpersonal sensitivity	Depression	Anxiety	Hostile	Terror	Paranoia	Psychosis
A	271.6 \pm 39.44	2.99 \pm 0.61	3.08 \pm 0.78	3.16 \pm 0.32	2.83 \pm 0.58	3.45 \pm 0.25	2.77 \pm 0.44	2.66 \pm 0.58	2.69 \pm 0.49	2.84 \pm 0.55
n = 11	259.1 \pm 30.20	2.80 \pm 0.29	2.53 \pm 0.43	3.38 \pm 0.42	2.41 \pm 0.44	3.08 \pm 0.40	2.52 \pm 0.26	2.19 \pm 0.35	2.54 \pm 0.39	2.75 \pm 0.49
t	32.21	1.25	11.95	0.25	21.69	15.69	−1.252	23.65	0.632	1.136
p	0.002	0.356	0.001	0.895	0.021	0.003	0.596	0.016	0.524	0.256
B	221.6 \pm 30.14	2.80 \pm 0.21	2.98 \pm 0.38	3.06 \pm 0.32	2.88 \pm 0.58	2.85 \pm 0.25	2.57 \pm 0.44	2.56 \pm 0.58	2.49 \pm 0.49	2.64 \pm 0.35
n = 22	201.1 \pm 19.20	2.41 \pm 0.49	2.03 \pm 0.23	2.98 \pm 0.42	2.51 \pm 0.44	2.58 \pm 0.40	2.42 \pm 0.26	2.43 \pm 0.35	2.40 \pm 0.39	2.36 \pm 0.49
t	37.52	−2.256	20.23	2.56	15.69	25.36	0.256	2.67	0.215	0.985
p	0.011	0.085	0.012	0.083	0.010	0.004	0.152	0.065	0.852	0.378
C	190.68 \pm 38.12	2.22 \pm 0.62	2.49 \pm 0.41	2.43 \pm 0.36	2.51 \pm 0.32	2.44 \pm 0.35	2.06 \pm 0.38	2.24 \pm 0.42	2.43 \pm 0.21	2.41 \pm 0.17
n = 30	172.43 \pm 34.82	2.44 \pm 0.38	2.38 \pm 0.38	2.39 \pm 0.24	2.29 \pm 0.14	2.40 \pm 0.30	2.13 \pm 0.28	2.15 \pm 0.36	2.33 \pm 0.20	2.33 \pm 0.25
t	8.256	−1.254	0.986	1.591	9.689	1.200	−1.268	0.547	0.215	0.259
p	0.035	0.156	0.085	0.055	0.027	0.059	0.085	0.259	0.781	0.986
D	132.47 \pm 15.92	1.72 \pm 0.28	1.49 \pm 0.51	1.41 \pm 0.47	1.58 \pm 0.55	1.36 \pm 0.41	1.37 \pm 0.55	1.29 \pm 0.35	1.41 \pm 0.24	1.30 \pm 0.26
n = 680	125.15 \pm 19.05	1.31 \pm 0.49	1.23 \pm 0.31	1.25 \pm 0.27	1.24 \pm 0.23	1.21 \pm 0.21	1.24 \pm 0.22	1.16 \pm 0.20	1.27 \pm 0.29	1.27 \pm 0.20
t	1.621	4.569	1.201	3.658	8.965	3.548	0.265	0.159	0.986	0.800
p	0.055	0.038	0.051	0.040	0.012	0.035	0.098	0.146	0.587	0.069

A, one-on-one psychological consultation; B, small-scale group consultation; C, telephone consultation; D, WeChat or online consultation.

as demonstrated through various forms of EAP psychological assistance. Our findings reveal that professional psychological counseling could potentially alleviate psychological illnesses, provide a theoretical basis for promoting EAP psychological services in China, and demonstrate how to reduce pressure on hospital staff members during an epidemic. These implications are important, considering that these key factors could ultimately help overcome the epidemic.

At the beginning of the epidemic, healthcare workers on the front lines knew little about the novel coronavirus; however, their experience increased gradually over time (11). Because the risk of occupational exposure to the novel coronavirus is high for front-line medical workers, they also face immense psychological pressure. These healthcare professionals have devoted themselves to heavy treatment work, which required them to be in frequent contact with patients' blood, bodily fluids, and sharp medical instruments, while their psychological preparation and knowledge about the virus were limited (12). During working hours, medical staff members wear protective equipment that restricts their ability to breathe normally, and

they also experience other challenges such as physical and mental fatigue. When they are not working, their time to rest is in hotels, which is isolating. Their everyday lives are limited, they cannot meet with relatives and friends, and their social support is insufficient (13). Given all of these factors, medical workers have had to endure a significant amount of physical and mental stress during the epidemic.

In this study, we found that the abnormal psychological symptoms rate (i.e., an SCL-90 score of >160) of the first evaluation reached 18.26%, which was similar to the psychological abnormality of medical workers in Wuhan during the current novel coronavirus epidemic (14). Promptly identifying and resolving the abnormal psychological state of medical staff members is essential to combat the epidemic. Trade unions in the hospital actively provide free EAP psychological support services, thereby serving as a major source of support during the epidemic.

EAP services also play a major role in many medical units worldwide (15). In this epidemic, our EAP service provided a

TABLE 7 | Total scores and scores based on each factor of the two SCL-90 evaluations.

	Doctor	Nurse	Technologist	Officer	Worker	Z	P-value
Total scores	126.9 ± 29.18	138.68 ± 37.44	123.47 ± 29.92	134.75 ± 30.12	108.07 ± 16.93	42.58	<0.001
	125.1 ± 31.20	132.43 ± 34.82	112.15 ± 18.05	132.70 ± 31.71	105.84 ± 15.60	56.31	<0.001
Somatization	1.38 ± 0.31	1.53 ± 0.42	1.32 ± 0.28	1.54 ± 0.43	1.17 ± 0.19	94.126	< 0.001
	1.30 ± 0.29	1.44 ± 0.38	1.23 ± 0.19	1.49 ± 0.39	1.15 ± 0.17	59.179	< 0.001
Obsessive compulsive	1.57 ± 0.41	1.77 ± 0.50	1.56 ± 0.41	1.54 ± 0.46	1.37 ± 0.33	70.710	< 0.001
	1.53 ± 0.43	1.68 ± 0.48	1.43 ± 0.31	1.46 ± 0.44	1.31 ± 0.27	56.545	< 0.001
Interpersonal sensitivity	1.45 ± 0.40	1.53 ± 0.46	1.38 ± 0.37	1.58 ± 0.50	1.22 ± 0.24	48.376	< 0.001
	1.38 ± 0.42	1.49 ± 0.44	1.25 ± 0.27	1.54 ± 0.43	1.20 ± 0.24	50.077	< 0.001
Depression	1.46 ± 0.40	1.57 ± 0.48	1.38 ± 0.35	1.58 ± 0.47	1.21 ± 0.21	66.371	< 0.001
	1.41 ± 0.44	1.49 ± 0.44	1.24 ± 0.23	1.57 ± 0.40	1.17 ± 0.20	61.452	< 0.001
Anxiety	1.39 ± 0.35	1.53 ± 0.45	1.35 ± 0.30	1.34 ± 0.40	1.16 ± 0.17	89.469	< 0.001
	1.38 ± 0.40	1.44 ± 0.40	1.21 ± 0.21	1.32 ± 0.36	1.14 ± 0.18	66.874	< 0.001
Hostile	1.38 ± 0.34	1.55 ± 0.48	1.38 ± 0.35	1.48 ± 0.36	1.17 ± 0.19	69.966	< 0.001
	1.22 ± 0.26	1.53 ± 0.48	1.24 ± 0.22	1.43 ± 0.42	1.12 ± 0.17	82.026	< 0.001
Terror	1.33 ± 0.38	1.43 ± 0.42	1.23 ± 0.25	1.39 ± 0.38	1.13 ± 0.18	71.832	< 0.001
	1.29 ± 0.35	1.35 ± 0.36	1.16 ± 0.20	1.37 ± 0.33	1.12 ± 0.18	53.025	< 0.001
Paranoia	1.30 ± 0.31	1.40 ± 0.41	1.31 ± 0.34	1.46 ± 0.42	1.14 ± 0.19	50.212	< 0.001
	1.24 ± 0.29	1.38 ± 0.40	1.17 ± 0.19	1.43 ± 0.35	1.12 ± 0.18	50.185	< 0.001
Psychosis	1.28 ± 0.30	1.39 ± 0.37	1.28 ± 0.26	1.47 ± 0.38	1.14 ± 0.17	49.524	< 0.001
	1.25 ± 0.29	1.33 ± 0.35	1.17 ± 0.20	1.41 ± 0.35	1.14 ± 0.18	45.706	< 0.001

meaningful platform to relieve the psychological pressure for the majority of medical staff members. During the early stages of the novel coronavirus outbreak, the psychological burden of self-assessment and the enthusiasm to participate in the SCL-90 assessment were both high. Over time, China's control of the novel coronavirus is improving, and the incidence rate is declining gradually. The hospital staff, especially doctors, have also gained confidence in controlling the epidemic, and participation in the SCL-90 assessments has declined. In analyzing hospital employees with a total SCL-90 score of >160, significant differences were detected when considering factors such as age, gender, educational background, professional title, position, post category, and marital status. We found that employees whose SCL-90 scores indicated abnormal psychological symptoms tended to be women, workers between 30 and 39 years old, nurses, undergraduates, employees with intermediate professional titles, and unmarried individuals; as such, our EAP psychological assistance targets were also concentrated on these employees. The mental health status of men is better than that of women, which might be related to the different social roles and life pressures borne by different genders. Typically, it is believed that women's psychological ability to deal with crises is on the low side (16). Regarding levels of education, researchers have found that high educational backgrounds are correlated with improved mental health status due to the maturing of the psychological defense mechanism, resulting in greater self-control and social adaptability (17). In this study, the abnormal psychological symptoms rate of nurses' scores was considerably high. This finding could be related to nurses constituting a major subset of the healthcare

workers on the front lines of the epidemic. China's fertility situation is different from that of other countries because of the two-child policy, which was instituted in 2015 (18). The present study found that a hospital worker's number of children was not correlated with his or her abnormal mental state.

China has focused on the psychological counseling of medical staff and psychological disorders during epidemics such as SARS, and earlier psychological interventions have led to better results (19). During the novel coronavirus epidemic, psychological care was provided early in many parts of China, especially Hubei; many medical teams in Hubei are equipped with psychiatrists (20). EAP organizations have played a critical role in alleviating employees' psychological problems internationally (21). For example, our hospital introduced an EAP psychological counseling team in 2015. For group intervention, we used the hospital's official WeChat account for collective training and focusing on online activities. Specifically, the emotional intelligence group intervention improved the emotional intelligence levels of the medical staff and their quality of life. This form of intervention could also be used for psychological quality training and stress management of the medical staff.

Because our counseling was conducted voluntarily, only 11 individuals were willing to receive one-on-one counseling. The majority of the medical staff chose to participate in group training, online resources, or telephone counseling.

Approximately 300 million people worldwide have mild to moderate mental illnesses, but not all individuals can

TABLE 8 | Total scores and scores based on each factor of the two SCL-90 evaluations(M ± SD).

	Total scores	Somatization	Obsessive compulsive	Interpersonal sensitivity	Depression	Anxiety	Hostile	Terror	Paranoia	Psychosis
D	127.6 ± 29.44	1.40 ± 0.41	1.64 ± 0.48	1.46 ± 0.52	1.48 ± 0.48	1.45 ± 0.65	1.37 ± 0.44	1.28 ± 0.58	1.25 ± 0.41	1.26 ± 0.45
<i>n</i> = 82	125.1 ± 31.20	1.34 ± 0.29	1.63 ± 0.43	1.38 ± 0.42	1.21 ± 0.44	1.31 ± 0.40	1.22 ± 0.26	1.29 ± 0.35	1.24 ± 0.29	1.25 ± 0.29
<i>t</i>	1.010	0.258	0.985	1.032	5.985	6.254	0.895	−1.251	0.659	1.891
<i>p</i>	0.596	0.635	0.321	0.658	0.012	0.026	0.115	0.895	0.956	0.625
N	140.68 ± 38.12	1.57 ± 0.62	1.69 ± 0.61	1.53 ± 0.56	1.61 ± 0.42	1.54 ± 0.65	1.56 ± 0.78	1.44 ± 0.52	1.43 ± 0.51	1.41 ± 0.77
<i>n</i> = 303	131.43 ± 34.82	1.24 ± 0.38	1.68 ± 0.48	1.39 ± 0.44	1.49 ± 0.44	1.44 ± 0.40	1.53 ± 0.48	1.45 ± 0.36	1.38 ± 0.40	1.33 ± 0.35
<i>t</i>	8.592	3.698	0.621	2.215	5.685	3.658	0.254	−1.185	0.584	0.208
<i>p</i>	0.025	0.042	0.085	0.035	0.037	0.014	0.897	0.968	0.857	0.587
T	123.47 ± 29.92	1.32 ± 0.28	1.49 ± 0.51	1.41 ± 0.47	1.41 ± 0.55	1.36 ± 0.41	1.37 ± 0.55	1.29 ± 0.55	1.41 ± 0.24	1.30 ± 0.46
<i>n</i> = 77	121.15 ± 19.05	1.31 ± 0.49	1.43 ± 0.31	1.35 ± 0.27	1.24 ± 0.23	1.21 ± 0.51	1.34 ± 0.22	1.26 ± 0.20	1.17 ± 0.19	1.27 ± 0.20
<i>t</i>	0.985	0.154	1.021	0.754	3.587	1.852	0.852	0.569	4.652	0.875
<i>p</i>	0.598	0.698	0.962	0.658	0.041	0.043	0.365	0.125	0.035	0.195
O	134.75 ± 30.12	1.54 ± 0.43	1.54 ± 0.46	1.58 ± 0.50	1.58 ± 0.47	1.34 ± 0.40	1.48 ± 0.36	1.39 ± 0.38	1.46 ± 0.42	1.47 ± 0.38
<i>n</i> = 51	130.70 ± 34.71	1.44 ± 0.62	1.51 ± 0.40	1.53 ± 0.31	1.56 ± 0.49	1.31 ± 0.26	1.44 ± 0.49	1.36 ± 0.39	1.44 ± 0.15	1.42 ± 0.65
<i>t</i>	1.251	0.957	0.121	1.230	0.845	0.966	1.012	0.854	0.857	0.555
<i>p</i>	0.986	0.081	0.658	0.945	0.178	0.845	0.256	0.965	0.563	0.981
W	110.07 ± 16.03	1.18 ± 0.29	1.39 ± 0.53	1.26 ± 0.44	1.24 ± 0.41	1.19 ± 0.37	1.20 ± 0.49	1.14 ± 0.28	1.19 ± 0.31	1.15 ± 0.27
<i>n</i> = 110	105.84 ± 15.60	1.15 ± 0.17	1.31 ± 0.27	1.20 ± 0.24	1.17 ± 0.20	1.14 ± 0.18	1.12 ± 0.17	1.12 ± 0.18	1.17 ± 0.18	1.14 ± 0.18
<i>t</i>	2.532	0.952	0.232	0.521	1.582	0.852	0.365	0.254	0.584	0.977
<i>p</i>	0.042	0.112	0.895	0.691	0.036	0.054	0.874	0.986	0.258	0.685

D, doctors; N, nurses; T, technicians; O, office staff; W, workers.

recognize their illnesses (22). Chinese studies have found that the biggest enemy of the popularization of psychological services is a bias in the public's perception of receiving psychological care; shame is a barrier between psychological counseling workers and the general public (23). In this regard, the results of our survey are consistent with other Chinese studies. Furthermore, even if psychological illnesses are identified, not all individuals choose to actively seek help. In this epidemic, a large-scale psychological survey of medical staff in Hunan also found that medical staff members are unwilling to face their psychological illnesses or challenges and feel that receiving psychological counseling is embarrassing (24). Thus, medical institutions should strengthen the psychological skills training of medical staff members so that hospitals can alleviate patients' anxiety, panic, and other psychological problems and improve the psychological well-being of their healthcare professionals. Increasing social support and setting up psychological intervention groups for medical staff members with anxiety and stress disorders is also a helpful and actionable step that hospitals can take, with the earliest interventions being ideal (25).

In this survey, we found that after a positive psychological intervention, the number of individuals with an SCL-90 total score of >160 decreased significantly. We also found that before EAP, the scores of obsessive-compulsive symptoms of hospital workers in various occupations were high, and among the nurses, the overall score was highest. Furthermore, the anxiety of doctors in Hubei and the fever clinics was severe, indicating the necessity of actively

providing EAP psychological assistance to these high-risk groups. After the EAP provided psychological assistance to hospital workers, each factor score was lower than that of the initial assessment, indicating relief in all aspects of psychological illness. This finding also shows that actively providing and encouraging employees to participate in EAP psychological counseling can significantly alleviate abnormal psychological symptoms.

A limitation of this study is that it is observational; hence, we could not analyze the true causes of severe psychological symptoms through a survey. Our research has the inevitable defects of an online survey, such as the limitation of questionnaire design, the difficulty in guaranteeing the sample size, the accuracy of demographic information, and the cheating behavior of participants. Moreover, some important data was not collected, such as work performance-related outcomes and how employees perceive their employers' resources. Finally, in follow-up observations, only a small proportion of healthcare professionals were willing to participate in one-on-one psychological help and the intervention time was short. Considering the second evaluation, some medical personnel thought that they had no problems and refused to participate, resulting in a reduction in the data for analysis. Therefore, the current results can only reflect some of the psychological changes that occurred during this period. Increasing the publicity of psychological counseling could increase the number of people willing to receive psychological assistance. Thus, the EAP could help a larger number of professionals. In addition, the limitation of this article is

the use of electronic questionnaires. The paper version of the questionnaire is conducive to more detailed thinking of the questionnaire respondents, and at the same time it is more widely used. However, during the epidemic, in order to reduce the gathering of people, we adopted the form of electronic questionnaires. In order to avoid wasting resources, we repeatedly trained and informed participants before the survey.

This study supports the practice of hospitals providing psychological assistance to high-risk medical staff in the future via an optimized plan, especially in the event of a sudden and major epidemic. These services have the potential to help healthcare professionals manage their mental health while fighting against the novel coronavirus epidemic.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

REFERENCES

- World Health Organization. *Novel Coronavirus (2019-nCoV) Situation Reports Parts* (2020). p. 1–7. Available online at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports> (accessed February 1, 2020).
- Chen HJ, Guo JJ, Wang C, Luo F, Yu X, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet*. (2020) 395:809–15. doi: 10.1016/S0140-6736(20)30360-3
- Wu P, Fang YY, Guan ZQ, Fan B, Kong J, Yao Z, et al. The psychological impact of the sars epidemic on hospital employees in china: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry*. (2009) 54:302–11. doi: 10.1177/070674370905400504
- Xiao H, Zhang Y, Kong DS, Li S, Yang N. The effects of social support on sleep quality of medical staff treating patients with coronavirus disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci Monit*. (2020) 26:e923549. doi: 10.12659/MSM.923549
- Asmundson GJG, Taylor S. How health anxiety influences responses to viral outbreaks like COVID-19: what all decision-makers, health authorities, and health care professionals need to know. *J Anxiety Disord*. (2020) 71:102211. doi: 10.1016/j.janxdis.2020.102211
- Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. *Lancet*. (2020) 395: 470–3. doi: 10.1016/S0140-6736(20)30185-9
- Attridge M. A global perspective on promoting workplace mental health and the role of employee assistance programs. *American Journal of Health Promotion*. (2019) 33:622–9. doi: 10.1177/0890117119838101c
- Derogatis LR. *How to Use the Symptom Distress Checklist (SCL-90) in Clinical Evaluation: Psychiatric Rating Scale. Vol III: Self-Report Rating Scale*. Nutley, NJ: Hoffmann-La Roche (1975).
- Derogatis LR, Lipman RS, Covi L. SCL-90: an outpatient psychiatric rating scale—preliminary report. *Psychopharmacol Bull*. (1973) 9: 13–28.
- Du ML, Deng WX, Sun W, Ching C-W, Tung T-H, Zou X-C. Assessment of mental health among nursing staff at different levels. *Medicine*. (2020) 99:e19049. doi: 10.1097/MD.00000000000019049
- Salehi S, Abedi A, Balakrishnan S, Gholamrezaezhad A. Coronavirus disease 2019. (COVID-19): a systematic review of imaging findings in 919 patients. *AJR Am J Roentgenol*. (2020) 14:1–7. doi: 10.2214/AJR.20.23034
- Palacios Cruz M, Santos E, Velázquez Cervantes, León Juárez M. COVID-19, a worldwide public health emergency. *Rev Clin Esp*. (2020) 221:55–61. doi: 10.1016/j.rceng.2020.03.001
- Dong L, Bouey J. Public mental health crisis during COVID-19 pandemic, China. *Emerg Infect Dis*. (2020) 26:1616–8. doi: 10.3201/eid2607.200407
- Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry*. (2020) 7:e14. doi: 10.1016/S2215-0366(20)30047-X
- Chen A, Swisher L, Brown M, Zarzar R, Scott N, Fruchter E, et al. Assessment of an opt-out employee assistance program assessment to mitigate burnout and reduce barriers to seeking mental health care in emergency medicine residents. *Western J Emerg Med*. (2019) 20: S41–2.
- Aslan M, Radhakrishnan K, Rajeevan N, Sueiro M, Goulet JL, Li Y, et al. Suicidal ideation, behavior, and mortality in male and female US veterans with severe mental illness. *J Affective Disorders*. (2020) 267:144–52. doi: 10.1016/j.jad.2020.02.022
- Desouky D, Allam H. Occupational stress, anxiety and depression among Egyptian teachers. *J Epidemiol Glob Health*. (2017) 7:191–8. doi: 10.1016/j.jegh.2017.06.002
- Zeng Y, Hesketh T. The effects of China's universal two-child policy. *The Lancet*. (2016) 388:1930–8. doi: 10.1016/S0140-6736(16)31405-2
- Chua S E, Cheung V, McAlonan G M, Cheung C, Wong JWS, Cheung EPT, et al. Stress and psychological impact on SARS patients during the outbreak. *Can J Psychiatry*. (2004) 49:385–90. doi: 10.1177/070674370404900607
- Moorthy V, Restrepo AMH, Preziosi MP, Swaminathan S. Data sharing for novel coronavirus (COVID-19). *Bull World Health Organ*. (2020) 98:150. doi: 10.2471/BLT.20.251561
- Ettner SL. *The Effect of Employee Assistance Programs (EAPs) on Behavioral Healthcare Utilization: The Role of Race/Ethnicity* (UCLA Electronic Thesis and Dissertations), University of California, Los Angeles, CA, United States (2019).
- World Health Organization. *Depression and Other Common Mental Disorders: Global Health Estimates. White Paper*. Geneva, Switzerland: WHO (2017).

ETHICS STATEMENT

This study was approved by the ethics committee of the Eastern Campus of the Sixth People's Hospital of Shanghai. All participants provided informed consent before taking the survey.

AUTHOR CONTRIBUTIONS

JX, XL, and YX: the overall design and data analysis of the project and the revision of the article. YC and JZ: data collection. XF and YC: data analysis. XF, YC, and JZ: article writing. All authors contributed to the article and approved the submitted version.

FUNDING

This research was funded by Research on the long-term care mechanism of medical staff from the perspective of system planning, grant number 2020WJ019; The project of Shanghai Health Commission for the promotion of advanced and appropriate technologies, grant number 2019SY051.

23. Tseng CK. The past, present and future of psychology in China. *Hydrobiologia*. (2004) 512:11–20. doi: 10.1023/B:HYDR.0000020363.37807.ec
24. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatry*. (2020) 7:e15–6. doi: 10.1016/S2215-0366(20)30078-X
25. Tan Chunxia. Clinical observation on psychological intervention in treatment of patients with anxiety disorders. *Nurs Integr Tradit Chin Western Med*. (2016) 2:100–1.

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Substantial Impact of COVID-19 on Self-Reported Mental Health of Healthcare Professionals in the Netherlands

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OPEN ACCESS

Edited by:

S. M. Yasir Arafat,
Enam Medical College, Bangladesh

Reviewed by:

Jana Chihai,
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Specialty section:

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

Received: 17 October 2021

Accepted: 13 December 2021

Published: 10 January 2022

Citation:

de Vroege L. and van den Broek A
(2022) Substantial Impact of
COVID-19 on Self-Reported Mental
Health of Healthcare Professionals in
the Netherlands.
Front. Public Health 9:796591.
doi: 10.3389/fpubh.2021.796591

Initially, the COVID-19 pandemic caused a continued pressure on professionals working in hospitals due to the increase of affected patients. At the moment, the pandemic continues but thanks to all kinds of measures (e.g., social distancing) workload seems to decrease at the hospitals. On the contrary, patients with long-lasting symptoms due to COVID-19 infection or the pandemic begin to merge at the mental healthcare institutions in the Netherlands but this also holds true for other countries. Furthermore, healthcare professionals are affected by safety measures such as working from home, which led to an increased feeling of stress and may have led to a misbalance in work and private life. As a result, the question whether healthcare employees in mental healthcare experience impaired mental health remains unclear and chances are fair that mental health problems such as exhaustion and burnout may be prevalent. This study describes an online survey in which mental health amongst mental healthcare professionals is investigated. About 1,300 professionals from a large number of mental healthcare institutions replied the survey. Around 50% of the respondents experienced increased levels of stress. Feelings of anxiety, anger, and sadness were also increasingly experienced due to the COVID-19 pandemic. Furthermore, 4.2% replied that they were considering resigning their jobs which is alarming considering the shortage of healthcare professionals in mental healthcare institutions. The results support the importance of treatment or support of professionals in mental healthcare that experience psychological ailments.

Keywords: COVID-19, SARS-Cov-2, pandemic, mental health, healthcare professionals, the Netherlands

INTRODUCTION

Since 2019, the global COVID-19 pandemic is not dispensable in everyday life. Due to the widespread transmission, at the start of the pandemic a huge load of cases entered the hospitals and as a result the workload increased for healthcare professionals within the hospital. As the pandemic continued, more and more studies evaluated or started evaluating the impact of COVID-19 (1) on the mental health and well-being of these professionals. Heightened levels of stress, depression, and anxiety were already reported in the general population (2, 3). For professionals, the continuing pressure at work increases psychological pressure ultimately leading to feelings of helplessness, feelings of stress, irritability, and mental fatigue (4). Protection of the mental health of professionals working in healthcare has been identified as imperative (5) but has yet received little attention.

Several measures have been evoked by all affected countries such as lockdown to limit the spread of COVID-19 and the introduction of social distancing in public places which is considered standard procedure in case of a pandemic (6). Due to the nature of their work, professionals in healthcare are more exposed to infection, which means that such safety measures less apply for them. This may contribute to feelings of anxiety or other mental health symptoms. Furthermore, long hours and increased working load can contribute to feelings of exhaustion and tiredness which can ultimately contribute to the development of burn-out. Hence, the health of healthcare professionals during the pandemic is stressed by several authors (7–9). However, not only healthcare professionals but employees in healthcare in general may suffer from decreased mental health since the safety measures also apply on them. Furthermore, as the measurements decrease their workload also increased since waiting lists increased during the pandemic and (part of the) work is left behind. Also negative emotions, feelings of being inadequately supported are factors that may contribute mental burden (10) and confirmed or suspected cases of COVID-19 in the surrounding of professionals may further contribute to fear of disease.

Studies focusing on other pandemics already showed that the effect on mental health regarding stress, anxiety, and depression is substantial (11–16). Moreover, burnout and secondary traumatization were primarily reported by healthcare professionals primarily and were associated with increased depression and anxiety (17). Some studies also showed the same results amongst healthcare professionals in the COVID-19 pandemic (18, 19) and the need for specific interventions to support mental health due the pandemic is stressed (20). Due to staff shortage, in general, and the risk of developing burn-out, the consequences for professionals in mental healthcare due to the pandemic are pivotal. For instance, the psychological impact on professionals has severe negative consequences for institutions regarding patient care and, more in general, the healthcare system (21). Furthermore, the experience of negative emotions was related to poor work performance and resignation (22). However, information regarding mental health among mental healthcare professionals specific have not yet been comprehensively explored and reported in the Netherlands. Such survey is necessary to provide more mental healthcare for professionals which stress the need to understand the mental health of professionals in mental healthcare.

To the best of our knowledge, this is the first large study amongst mental health status in mental healthcare professionals across the Netherlands. This study examines mental health status regarding symptoms of anxiety, depression, anger, and sadness and levels of stress during the COVID-19 pandemic and explored the contribution of the pandemic to these feelings. Furthermore, we explored work status and plans to re-organize work (e.g., working less hours, considering quitting their job) due to the COVID-19 pandemic. Mental health support for professionals is much needed based upon previous investigations (8, 23). Such support of professionals in mental healthcare may be advised based upon the findings of this survey.

MATERIALS AND METHODS

Study Design and Sample

We distributed an internet survey through social media (using LinkedIn) and send the survey to the board of directors of the (large) mental health institutions (with an average of 2,500 employees) of the Netherlands. Colleagues were asked to respond between august 4th and September 11th 2021. They survey was distributed using Qualtrics. We did not specifically focus on a specific type of employee within the mental health institutions so all employees that responded to our survey are referred to as professional within this article.

Initially, 1,399 responses were registered. 16 (1.1%) respondents did not start with the survey and 11 (0.9%) did not complete more than 50% of the questions and were therefore excluded from the study sample. Eventually, the sample included 1,372 respondents who stated to work within a mental health institution of which 74 (5.4%) did not want to respond to the question in which institution they were employed (i.e., wanted to remain anonymous). Their responses regarding experienced mental health were used nevertheless.

Survey Questions and Distribution

Questions regarding experienced mental health during the COVID-19 pandemic included questions regarding the experience of increased symptoms of anxiety, sadness, levels of stress, sadness, and anger. Furthermore, three questions regarding work/private life balance were asked in order to evaluate the ability of professionals to balance life working from home. Three other questions were asked related to sick leave, taken days off, and absenteeism during the pandemic. Finally, we asked the respondents whether they were considering re-organizing their work (e.g., working less hours, quitting their job). Hence this survey was also used to evaluate mental health per institution (some of the institutions participate in a conjoint alliance), and due to the extent of the questions we decided to record the responses anonymously and therefore did not ask for age, gender, and other sociodemographic variables.

Statistical Analyses

Categorical variables were presented by means of frequency tables. Comparisons between continuous variables were explored using paired-sample *t*-tests. We explored distribution differences between categorical variables with *Cramer's V*. The dataset was analyzed using the Statistical Package for the Social Sciences (SPSS) version 27.

RESULTS

Experienced Mental Health Symptoms During COVID-19

Table 1 includes the results of the mental health symptoms exploration and the results of questions regarding balance between work and private.

First, most respondents (48.5%, $n = 658$) stated to experience higher levels of stress due to the pandemic and 30.3 % ($n = 409$) experienced more feelings of depression. More symptoms

TABLE 1 | Mental health symptoms and balance work and private during the COVID-19 pandemic.

Questions						
Compared to before the COVID-19 pandemic, i experience						
	More symptoms of <i>n</i> (%)	Not more/not less symptoms of <i>n</i> (%)	Less symptoms of <i>n</i> (%)	Missing <i>n</i> (%)		
Anxiety	262 (19.4)	1055 (78.3)	31 (2.3)	24 (1.8)		
Depression	409 (30.3)	911 (67.5)	29 (2.1)	23 (1.7)		
Higher levels of stress	658 (48.5)	650 (47.9)	49 (3.6)	15 (1.1)		
Sadness	190 (14.2)	1119 (83.4)	33 (2.5)	30 (2.2)		
Anger	318 (23.6)	994 (73.8)	35 (2.6)	25 (1.8)		
Compared to before the COVID-19 pandemic:						
Due to working from home, work and private balance has tipped the scale toward work						
	Agree <i>n</i> (%)	Partly agree <i>n</i> (%)	Neutral <i>n</i> (%)	Partly disagree <i>n</i> (%)	Disagree <i>n</i> (%)	Missing <i>n</i> (%)
	127 (9.4)	331 (24.6)	387 (28.7)	157 (11.7)	345 (25.6)	25 (1.8)
I can less effectively balance work and private						
	Agree <i>n</i> (%)	Partly agree <i>n</i> (%)	Neutral <i>n</i> (%)	Partly disagree <i>n</i> (%)	Disagree <i>n</i> (%)	Missing <i>n</i> (%)
	213 (15.7)	457 (33.7)	264 (19.5)	126 (9.3)	295 (21.8)	25 (1.8)
I cannot balance (anymore) between work and private						
	Agree <i>n</i> (%)	Partly agree <i>n</i> (%)	Neutral <i>n</i> (%)	Partly disagree <i>n</i> (%)	Disagree <i>n</i> (%)	Missing <i>n</i> (%)
	49 (3.6)	224 (16.7)	403 (30.0)	213 (15.8)	455 (33.9)	17 (1.2)

missing values are displayed in last column and reflect missed responses on the according question and are calculated using the total sample of respondents ($N = 1372$).

of anger was mentioned by 23.6% ($n = 318$) respondents, 19.4% ($n = 262$) respondents stated of experience more anxiety and 14.2% ($n = 190$) more sadness. Between 47.9 and 83.4% of the respondents stated that they did not experience either more or less symptoms of anxiety, depression, sadness, or anger or stress levels due to the pandemic. Less mental symptoms due to the pandemic were experienced by 2.1 to 3.6% of the respondents.

Respondents stated that they felt worse during the COVID-19 pandemic compared to before the pandemic on a 0–100 scale. In general, differences regarding self-reported level of mental health before the pandemic ($M = 79.70$, $SD = 11.39$) compared to during the pandemic ($M = 70.96$, $SD = 14.62$) were significantly worsened [$t_{(1360)} = 22.06$, $p < 0.001$, $Cohen's d = 0.60$]. More specifically, respondents stated that the COVID-19 pandemic significantly contributed to decreased mental health regarding anxiety ($Cramer's V = 0.14$, $p = 0.004$), depression ($Cramer's V = 0.26$, $p < 0.001$), higher levels of stress ($Cramer's V = 0.30$, $p < 0.001$), but not for sadness ($Cramer's V = 0.16$, $p < 0.001$) or anger ($Cramer's V = 0.19$, $p < 0.001$).

Sick Leave and Absenteeism During COVID-19

Table 2 describes the results of questions regarding sick leave and absenteeism during the COVID-19 pandemic.

Between 68.2 and 70.3% stated that they did not taken more sick leave, more days off or were more absent during the COVID-19 pandemic. However, 11.3% ($n = 154$; agree) and 9.0% ($n = 122$; partly agree) reported taken more sick leave and 7.5% ($n = 101$; agree) and 12.4% ($n = 168$; partly agree) reported to have taken more days off. Between 7.8% ($n = 106$, partly agree) and 8.8% ($n = 120$; agree) stated to be more absent during the pandemic.

28.6% ($n = 298$) and 27.8% ($n = 290$) of the respondents stated that the COVID-19 pandemic contributed to or contributed to some extent, respectively, to their experienced (decreased) mental health during the participation in this survey. 23.7% ($n = 247$) stated that the COVID-19 pandemic contributed a little to their well-being and 19.9% ($n = 208$) stated that it did not.

TABLE 2 | Work-related questions regarding absenteeism and sick leave.

Question	Which statement holds true regarding sick leave and/or absenteeism during the COVID-19 pandemic?	
	I have taken more sick leave n (%)	Missing values n (%)
Agree	154 (11.3)	
Partly agree	122 (9.0)	
Neutral	109 (8.0)	
Partly disagree	47 (3.5)	
Disagree	925 (68.2)	
		15 (1.1)
	I have taken more days off n (%)	
Agree	101 (7.5)	
Partly agree	168 (12.4)	
Neutral	137 (10.1)	
Partly disagree	70 (5.2)	
Disagree	875 (64.8)	
		21 (1.5)
	I was more absent n (%)	
Agree	120 (8.8)	
Partly agree	106 (7.8)	
Neutral	119 (8.8)	
Partly disagree	57 (4.2)	
Disagree	954 (70.3)	
		14 (1.0)

missing values are displayed in last column and reflect missed responses on the according question and are calculated using the total sample of respondents (N = 1372).

Work-Related Results

Table 3 describes the results regarding intentions to organize work differently. 101 respondents stated to consider working less hours (7.5%) and 56 (4.2%) stated considering quit working in healthcare. Four hundred and twenty-fifth respondents (31.5%) stated to consider working more from home whilst 767 (56.9%) replied that they did not consider reorganizing their working hours and/or situation.

DISCUSSION

This national-based online survey reported the prevalence of mental health status of employees in mental healthcare in the Netherlands. Our study shows that employees in mental healthcare reported high levels of stress (about 50%), and more symptoms of depression (30%), and anxiety (14%). Based on the finding, these symptoms were primarily the result of the COVID-19 pandemic. In general, respondents also stated they were considering re-organizing their work by either working less hours (7.5%) or working more from home (31.5%). 4.2% were considering resignation. Findings from the current study stress the need for professional support of professionals in mental healthcare. The precariousness of the healthcare system warrants governmental and

TABLE 3 | Reorganization of work.

Question	Due to the COVID-19 pandemic, I consider to reorganize my work n (%)	Missing values n (%)
No, I don't consider reorganizing my work	767 (56.9)	
Yes, I consider working more from home	425 (31.5)	
Yes, I consider quitting working in health care	56 (4.2)	
Yes, I consider working less hours	101 (7.5)	
		23 (1.7)

missing values are displayed in last column and reflect missed responses on the according question and are calculated using the total sample of respondents (N = 1372).

organizational policies during the continuation of the COVID-19 pandemic.

A recent large systematic review in the Lancet (24) showed that due to the COVID-19 pandemic, prevalence rates of (major) depressive disorder and anxiety disorder increased substantially. Furthermore, their results showed that females were more affected by the pandemic than males with regards to depressive and anxiety disorder. Since more females than males are working in mental health, these results are alarming with regard to sick leave and/or unemployment due to mental illness. Furthermore, our results are in line with the results of other studies (11, 13, 14) but also compared to the results of previous pandemics (12) which further stresses the need providing aid to healthcare workers.

This is the first study that explored mental health status of Dutch professionals in mental healthcare with a large response rate. This survey ensured maximum anonymity of the respondents. Prior to distributing the survey, we accepted this limitation in light of our opinion that it would increase responses. Furthermore, small numbers of missing values can be reported. 1–2.2% of the initial respondents did not complete or did not answer the specific question. One other limitation of this study concerns its cross-sectional characteristic, conclusions regarding causal contributions of COVID-19 pandemic or change over time of mental health status during the pandemic cannot be made. Furthermore, because of the accepted anonymity of our study, we are unable to follow-up individual responses throughout the rest of the pandemic which limited us in tracking individual changes over time. However, a future survey will be conducted to further explore long-term effects of the pandemic regarding mental health status since we know from previous pandemics that the development of posttraumatic stress disorder and/or burn-out can be prevalent (25).

In general, working in healthcare during pandemic times can be distressful for instance because of participation in acts that may transgress personal values, beliefs, and/or morals and has gained attention during COVID-19 (26, 27). Healthcare employees are sometimes faced with dilemmas without a “right” solution. Employees working in healthcare experience

(moral) distress which they related to conflicts between what they believed was right during the COVID-19 pandemic and institutional constraints (28, 29). This result shows the need for institutional meddling to prevent emotions such as overwhelm, fear, frustration and feelings of hopelessness, and helplessness. Since these emotions and feelings are associated with significant mental health challenges such as mental illnesses, behavioral issues (e.g., substance misuse), physical health challenges (e.g., sleep disturbances), and occupational impairment (e.g., burn-out and work absenteeism) (30).

Strategies for combating COVID-19 were primarily focused on the general health of the population, whilst the consequences of the pandemic become clearer and continue to develop strategies should yet also incorporate prevention and treatment of professionals in mental healthcare. Both government and healthcare institutions have the responsibility to protect their professionals regarding mental health. Prior studies from other pandemics show that the context of the institution has strong effects on psychological outcomes for the workforce (31). Furthermore, psychological support, focused on organizational but also individual characteristics is necessary (25). Social support outside the work environment, maintenance of social contact, but also clear communication and precautionary measures reduce the likelihood of emotional distress (31) and ultimately work absenteeism. Furthermore, promotion of self-care is much needed. Moreover, a study reported that professionals in healthcare have requested five things from managers during the pandemic: “hear me, protect me, prepare me, support me, and care for me” (32). Providing mental healthcare to their co-workers can be part of the psychosocial support that will create or increase resilience. Preparing young professionals during training how to cope with stressful experiences will prevent them from developing burn-out. Prior, or during, the development of such support, one should address stigma of being treated by a colleague thus creation of a safe environment, requires clear organizational strategies for mental health status of the staff, consistent and clear communication.

REFERENCES

1. Nochaiwong S, Ruengorn C. Mental health circumstances among health care workers and general public under the pandemic situation of COVID-19 (HOME-COVID-19). *Medicine*. (2020) 99:e20751. doi: 10.1097/MD.00000000000020751
2. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *Int J Res Public Health*. (2020) 17:1729. doi: 10.3390/ijerph17051729
3. Zhu Y, Chen L, Ji H, Xi M, Fang Y, Li Y. The risk and prevention of novel coronavirus pneumonia infections among inpatients in psychiatric hospitals. *Neurosci Bull*. (2020) 36:299–302. doi: 10.1007/s12264-020-00476-9
4. Huang JZ, Han MF, Luo TD, Ren AK, Zhou XP. [Mental health survey of medical staff in a tertiary infectious disease hospital for COVID-19]. *Chinese journal of industrial hygiene and occupational diseases*. (2020) 38:192–5. doi: 10.3760/cma.j.cn121094-20200219-00063
5. World Health Organization. *Mental Health and Psychosocial Considerations During the Covid-19 Outbreak*. (2020). Available online at: <https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf> (accessed October 8, 2021)

CONCLUSION

This study shows a high level of distress, anxiety, and depression amongst employees in mental healthcare in the Netherlands. The high level of distress (almost 50%) is worrying because of the possible development into burn-out. The fact that these high levels of distress may ultimately lead to sick leave or unemployment due to mental illness is also worrying. Furthermore, the heightened levels of anxiety and depression further warrant mental support to prevent work absenteeism due to, for instance, post-traumatic stress disorder or burn-out. Promotion of self-care is needed, as is psychosocial support which both require organizational support of staff and clear consistent communication to provide a good working environment. Due to the fact that the pandemic did not reach its end yet, it is expected that the pressure on healthcare will continue within the coming decades. Therefore, it is important to pay attention to self-care, work-life balance, and job satisfaction in the training of healthcare professionals.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors upon request.

ETHICS STATEMENT

The participants of this study provided consent obtained through the internet. The study protocol was approved by the scientific review committee of GGz Breburg (file number CWO 2021-35).

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

6. Wilder-Smith A, Freedman DO. Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *J Travel Med*. (2020) 27:taaa020. doi: 10.1093/jtm/taaa020
7. de Vroeghe L, Gribling G, van den Broek A. [‘Don’t forget yourself when taking care of others’ - mental support for health care professionals during the COVID-19 crisis]. *Tijdschrift voor psychiatrie*. (2020) 62:424–6. Available online at: <https://www.tijdschriftvoorpsychiatrie.nl/assets/articles/62-2020-6-artikel-devroeghe.pdf>
8. de Vroeghe L, van den Broek A. Results of mental support for health care professionals and mental care during the COVID-19 pandemic. *J Public Health*. (2021) 43:490–2. doi: 10.1093/pubmed/fdaa278
9. Sandesh R, Shahid W, Dev K, Mandhan N, Shankar P, Shaikh A, et al. Impact of COVID-19 on the Mental Health of Healthcare Professionals in Pakistan. *Cureus*. (2020) 12:e8974. doi: 10.7759/cureus.8974
10. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak.

- Lancet Psychiatry*. (2020) 7:e15–6. doi: 10.1016/S2215-0366(20)30078-X
11. Muller AE, Hafstad EV, Himmels JPW, Smedslund G, Flottorp S, Stensland S, et al. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: A rapid systematic review. *Psychiatry Res*. (2020) 293:113441. doi: 10.1016/j.psychres.2020.113441
 12. Lee SM, Kang WS, Cho AR, Kim T, Park JK. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. *Compr Psychiatry*. (2018) 87:123–7. doi: 10.1016/j.comppsy.2018.10.003
 13. Suryavanshi N, Kadam A. Mental health and quality of life among healthcare professionals during the COVID-19 pandemic in India. *Brain Behav*. (2020) 10:e01837. doi: 10.1002/brb3.1837
 14. Rahman MA, Rahman S, Wazib A, Arafat SMY, Chowdhury ZZ, Uddin BMM, et al. COVID-19 Related Psychological Distress, Fear and Coping: Identification of High-Risk Groups in Bangladesh. *Front Psychiatry*. (2021) 12:718654. doi: 10.3389/fpsy.2021.718654
 15. Xiong J, Lipsitz O, Nasri F, Lui LMW, Gill H, Phan L, et al. Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *J Affect Disord*. (2020) 277:55–64. doi: 10.1016/j.jad.2020.08.001
 16. Wang Y, Kala MB, Jafar TH. Factors associated with psychological distress during the coronavirus disease 2019 (COVID-19) pandemic on the predominantly general population: A systematic review and meta-analysis. *PLoS ONE*. (2020) 15:e0244630. doi: 10.1371/journal.pone.0244630
 17. Buselli R, Corsi M. Professional Quality of Life and Mental Health Outcomes among Health Care Workers Exposed to Sars-Cov-2 (Covid-19). *Int J Environ Res Public Health*. (2020) 17:6180. doi: 10.3390/ijerph17176180
 18. Li Z, Ge J, Yang M, Feng J, Qiao M, Jiang R, et al. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain Beh Immun*. (2020) 88:916–9. doi: 10.1016/j.bbi.2020.03.007
 19. Ornell F, Schuch JB. “Pandemic fear” and COVID-19: mental health burden and strategies. *Braz J Psychiatry*. (2020) 42:232–5. doi: 10.1590/1516-4446-2020-0008
 20. Rahman MA, Hoque N, Alif SM. Factors associated with psychological distress, fear and coping strategies during the COVID-19 pandemic in Australia. *Global Health*. (2020) 16:95. doi: 10.1186/s12992-020-00624-w
 21. Patel RS, Bachu R, Adikey A, Malik M, Shah M. Factors related to physician burnout and its consequences: a review. *Behav Sci*. (2018) 8:98. doi: 10.3390/bs8110098
 22. Bai Y, Lin CC, Lin CY, Chen JY, Chue CM, Chou P. Survey of stress reactions among health care workers involved with the SARS outbreak. *Psychiatr Serv*. (2004) 55:1055–7. doi: 10.1176/appi.ps.55.9.1055
 23. De Vroege L, Bruins D, Van den Broek A. [Health care professionals, don't forget yourself!]. *GZ-psychologie*. (2021) 13: 20–4. doi: 10.1007/s41480-021-0823-2
 24. Collaborators C-MD. Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. *Lancet*. (2021) 398:1700–12. doi: 10.1016/S0140-6736(21)02143-7
 25. Maund RG, Leszcz M, Savage D, Adam MA, Peladeau N, Romano D, et al. Applying the lessons of SARS to pandemic influenza: an evidence-based approach to mitigating the stress experienced by healthcare workers. *Can J Public Health*. (2008) 99:486–8. doi: 10.1007/BF03403782
 26. Williamson V, Murphy D, Greenberg N. COVID-19 and experiences of moral injury in front-line key workers. *Occup Med*. (2020) 70:317–9. doi: 10.1093/occmed/kqaa052
 27. Rushton CH, Thomas TA, Antonsdottir IM, Nelson KE. Moral Injury and Moral Resilience in Health Care Workers during COVID-19 Pandemic. *J Palliat Med*. (2021) 22. doi: 10.1089/jpm.2021.0076
 28. Lake ET, Narva AM, Holland S, Smith JG. Hospital nurses' moral distress and mental health during COVID-19. *J Adv Nurs*. (2021) 17. doi: 10.1111/jan.15013
 29. Cacchione PZ. Moral Distress in the Midst of the COVID-19 Pandemic. *Clin Nurs Res*. (2020) 29:215–6. doi: 10.1177/1054773820920385
 30. Hall NA, Everson AT, Billingsley MR, Miller MB. Moral injury, mental health and behavioural health outcomes: A systematic review of the literature. *Clin Psychol Psychother*. (2021). doi: 10.1002/cpp.2607
 31. Chan AO, Huak CY. Psychological impact of the 2003 severe acute respiratory syndrome outbreak on health care workers in a medium size regional general hospital in Singapore. *Occup Med*. (2004) 54:190–6. doi: 10.1093/occmed/kqh027
 32. Shanafelt T, Ripp J, Trockel M. Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. *JAMA*. (2020) 323:2133–4. doi: 10.1001/jama.2020.5893

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Marital Status and Gender Differences as Key Determinants of COVID-19 Impact on Wellbeing, Job Satisfaction and Resilience in Health Care Workers and Staff Working in Academia in the UK During the First Wave of the Pandemic

OPEN ACCESS

Edited by:

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Specialty section:

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

Received: 25 April 2022

Accepted: 01 June 2022

Published: 27 June 2022

Citation:

Peng J, Wu WH, Doolan G,
Choudhury N, Mehta P, Khatun A,
Hennelly L, Henty J, Jury EC,
Liao L-M and Ciurtin C (2022) Marital
Status and Gender Differences as Key
Determinants of COVID-19 Impact on
Wellbeing, Job Satisfaction and
Resilience in Health Care Workers and
Staff Working in Academia in the UK
During the First Wave of the
Pandemic.
Front. Public Health 10:928107.
doi: 10.3389/fpubh.2022.928107

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Background: The COVID-19 pandemic is an unprecedented global public health crisis that continues to exert immense pressure on healthcare and related professional staff and services. The impact on staff wellbeing is likely to be influenced by a combination of modifiable and non-modifiable factors.

Objectives: The aim of this study is to evaluate the effect of the COVID-19 pandemic on the self-reported wellbeing, resilience, and job satisfaction of National Health Service (NHS) and university staff working in the field of healthcare and medical research.

Methods: We conducted a cross sectional survey of NHS and UK university staff throughout the COVID-19 pandemic between May–November 2020. The anonymous and voluntary survey was disseminated through social media platforms, and via e-mail to members of professional and medical bodies. The data was analyzed using descriptive and regression (R) statistics.

Results: The enjoyment of work and satisfaction outside of work was significantly negatively impacted by the COVID-19 pandemic for all of staff groups independent of other variables. Furthermore, married women reporting significantly lower wellbeing than married men ($P = 0.028$). Additionally, the wellbeing of single females was significantly lower than both married women and men ($P = 0.017$ and $P < 0.0001$, respectively). Gender differences were also found in satisfaction outside of work, with women reporting higher satisfaction than men before the COVID-19 pandemic ($P = 0.0002$).

Conclusion: Our study confirms that the enjoyment of work and general satisfaction of staff members has been significantly affected by the first wave of the COVID-19 pandemic. Interestingly, being married appears to be a protective factor for wellbeing and resilience but the effect may be reversed for life satisfaction outside work. Our survey highlights the critical need for further research to examine gender differences using a wider range of methods.

Keywords: wellbeing, job satisfaction, resilience, health care workers, COVID-19 pandemic in the UK

INTRODUCTION

In December 2019, The Wuhan Municipal Health Commission reported a cluster of cases of an atypical pneumonia in Wuhan, China, which was later attributed to a novel coronavirus termed ‘severe acute respiratory syndrome coronavirus 2’ (SARS-CoV-2) (12). The COVID-19 pandemic was declared by the World Health Organization (WHO) on the 11th March 2020 and, as of November 2021, there have been over 258 million cases and 5.18 million deaths worldwide, with more than 9 million cases and 144,000 deaths reported in the UK (1).

In the UK, the mental health effects on the general population have attracted significant research interests. It was suggested that the prevalence of depression had increased from 10% before the pandemic (July 2019–March 2020) to 21% during the UK’s second wave of the pandemic (January 2021–March 2021). These findings, reported by the Office for National Statistics (ONS), also identified additional risk factors for depression, including female gender, age 16–39 years old, the presence of a disability, unemployment, living in a deprived area and the inability to afford an unexpected expense (2).

In general, health care workers (HCWs) are known to report higher levels of depression, anxiety, and stress compared to the general population (3), particularly affecting nurses and female staff in general (4). Unsurprisingly, recent research has shown that the COVID-19 pandemic has affected health professionals across the world (5–13). Risk factors associated with poorer psychological wellbeing in HCWs throughout the pandemic included age, sex and marital status. Being younger (9, 14–18) as well as older (19) correlated with poorer outcomes, while almost consistently, being a female had a negative impact of mental health during the pandemic (6–8, 11, 16–18, 20). Being single was more commonly associated with negative outcomes (19, 21, 22); however, one study focused on HCWs from the Eastern Mediterranean region reported alternative findings that being married was associated with reduced psychological wellbeing (23).

A study in Finland observed heightened levels of anxiety amongst all surveyed hospital workers, but this was found to be independent to their exposure to COVID-19 cases (14). Other studies found differences in wellbeing between occupational groups. Several studies have identified nurses to be the profession most at risk (7, 8, 13, 16, 17, 24, 25), while only a few studies have found physicians to have a higher level of stress (23) and depression (26) than other HCWs during the COVID-19 pandemic. Numerous studies have found an association between working on the frontline and lower psychological wellbeing

(5, 7, 9, 10, 18, 27). A large US based study of 5,550 clinical and non-clinical staff reported that anxiety, depression, and high levels of work exhaustion were independently associated with community or clinical exposure to COVID-19 (28). However, two studies have found that HCWs working on the frontline actually reported better psychological wellbeing compared to non-frontline staff (29, 30). The researchers postulated that this may be due to a greater sense of control and awareness of the situation. Another study from Singapore found that non-medical HCWs reported more anxiety compared to medical HCWs (31). Of interest is a study from Ethiopia that found that HCWs who perceived themselves as being at risk if infected with COVID-19 were four times more likely to be depressed in comparison to their colleagues (32), which points to the relevance of various psychological variables and personal views related to the individual risk of COVID-19 infection.

In contrast with negative outcomes, many studies investigated the resilience of HCWs, which is defined as the ability to positively adapt to traumatic or adverse experiences (33). As expected, the stress associated with life-style changes and pressures at work in the context of COVID-19 pandemic manifested in different coping behaviors with impact on the quality of life of HCWs. An integrative review explored the direct association between resilience and work engagement and social support, as well as negative correlations with anxiety and depression (34). In addition, some studies also highlighted geographic differences between the US (35) and China (36), where the pandemic was associated with a decrease vs. an increase in nurses’ resilience levels compared to pre-pandemic levels.

Research appears to have yielded contradictory findings in terms of which were the most vulnerable HCW groups and what type of support is likely to be required to mitigate for the consequences of the COVID-19 pandemic on the mental health and quality of life of HCWs. Many discrepancies highlighted by the literature are potentially explained by the large number of variables involved, including distinct regional conditions, clinical environment, changes to work patterns and the amount of perceived control and risks while at work, aspects that vary significantly between occupational groups and within the hierarchy of each professional group.

The aim of our study was to examine the effect of the COVID-19 pandemic on the mental health and wellbeing of National Health System (NHS) and University staff working in the field of healthcare and medical research in the UK. This was an exploratory survey focused on self-reported levels of wellbeing, resilience, and job satisfaction of staff both before (reported

retrospectively) and during the COVID-19 pandemic (reported in real-time). Our hypothesis was that the COVID-19 pandemic significantly affected the outcomes described above.

In addition to investigating the hypothesis above, we aimed at identifying and investigating the impact of various individual variables (as detailed below) on the mental health and wellbeing of both NHS and university staff during the first wave of COVID-19 pandemic in the UK. The intention was to guide the development of targeted support measures for staff, with a particular focus on staff members who have been highlighted in research as being potentially more vulnerable.

METHODS

Survey Design

We conducted a cross-sectional survey using Microsoft Forms (online platform) targeting NHS and university staff working in the UK through the COVID-19 pandemic between May and November 2020. The survey was disseminated through various social media platforms as well as being distributed to members of professional and medical bodies *via* e-mail.

Although our survey did not cover the whole period of COVID-19 pandemic in the UK, we took into consideration the timing of the government-imposed lockdowns and their potential influence on our collected outcomes. From 16th March 2020, the UK population was advised to avoid all non-essential traveling. Lock-down measures came into force on 26th March 2020 and were lifted nationally on 23rd of June. Further local lockdowns were imposed on the 4th July 2020. On the 14th August 2020 local restrictions were eased up to 14th October 2020 when a new three-tier system of restrictions in England.

The inclusion criteria for this study were as follows: (i) participants aged 18 years and above; and (ii) individuals who self-identified as working in a field related to healthcare; and (iii) ability to read and interpret the English language.

Approval was gained from relevant ethical bodies (UK Health Research Authority approval ref. IRAS ID 284105). Participation was both anonymous and voluntary, with implied consent. All participants were permitted to withdraw from the survey at any time by not completing or submitting their results.

QUESTIONNAIRE

Our survey consisted of 36 questions which gathered information on socio-demographic status, professional responsibilities, personal exposure to covid-19, remote working and redeployment, alongside self-reported levels of satisfaction, wellbeing, and resilience. The Content of the survey was analyzed and approved by an expert body that included academics, psychologists and regulatory bodies (UK Health Research Authority approval, reference: 20/HRA/2547). The respondents did not receive any incentive to complete the survey.

We collected data on various participant characteristics (predictors).

Socio-Demographic Information

Participants were asked questions on their age, gender, ethnicity, marital status, education level, and area of residence.

Professional Role and Responsibilities

Participants responded to various questions relating to their professional role and responsibilities including, job title, level of training and expertise, and area of work (community, research, pharmacy, or hospital setting).

Exposure to COVID-19

Individuals were questioned on their exposure to COVID-19, including personal illness with COVID-19, isolation during the pandemic, and direct exposure to COVID-19 positive cases through work or personal contacts.

Remote Working

Individuals were asked questions on their exposure to remote working, including changes to work environment because of the COVID-19.

Redeployment

Individuals were questioned on whether they had been redeployed during the COVID-19 pandemic. Individuals were asked to report their levels of anxiety related to redeployment on a visual analog scale (VAS) from 1 to 10.

We also collected data on psychological outcomes, such as:

Wellbeing

The Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) (37) is a validated tool with high internal validity for general population. The scale consisted of 14 items detailing statements about positive feelings and thoughts (rated from 1 - "none of the time" to 5 - "all the time"). The higher the value the higher the wellbeing. The value for Cronbach's Alpha for our survey was 0.94 (see **Appendix 1** for the details related to the wellbeing aspects assessed by this validated scale).

Resilience

The Resilience Scale (38) was initially developed to evaluate the levels of resilience in the general population. The shorter version is a 14-item scale, which is an abbreviated and validated version of the initial Resilience Scale (39). Higher scores indicate higher levels of resilience. The Cronbach's Alpha for our survey was 0.81 (see **Appendix 2** for the details of the resilience aspects assessed by this scale).

Satisfaction

The satisfaction of staff was assessed by asking individuals to score and compare their perceived levels (VAS scale 1–10) of job enjoyment and satisfaction outside of work from both before and during the COVID-19 pandemic using a single item approach (40). Higher scores indicate higher levels of satisfaction. The Cronbach's Alpha for our survey was 0.83.

STATISTICAL ANALYSIS

Sample Calculation

There are ~1.5 million of NHS and 0.5 million Higher Education employees in the UK. According to UK Government statistics approximately one in seven NHS workers have been redeployed during the first wave of the pandemic (Have NHS staff been redeployed due to COVID-19? | YouGov). For a 10% margin of

error in the estimation of wellbeing, resilience and job satisfaction of a total population of two million relevant professionals (even if not everyone was directly impacted through their work by the COVID-19 pandemic), the required sample size was 97, while for a 5% margin of error, the sample size required was 384.

Analysis

The data were collated using an Excel spreadsheet and analyzed using descriptive statistics based on the type of data distribution (normality test). We used R package (4.2.0) for statistical analysis: Student's *t*-test (for comparisons between two groups of variables with normal distribution) and Mann-Whitney U Test (for variables with skewed distribution), Fisher's exact test to assess for associations between two categorical variables, Welch's *t*-test (to test the hypothesis that two populations have equal means which we applied when comparing the male and female staff groups). We used linear regression to predict the outcome of interest (resilience, wellbeing or job satisfaction) when accounting for independent variables (such as gender, marital status, and other factors described above under *predictors*). $P < 0.05$ was considered statistically significant.

RESULTS

Characteristics of Survey Respondents

A total of 365 responses were received during the period of 6 months (May–November 2020) when the survey link was active which was an adequate sample size for a low margin error (5%). As the survey was also disseminated via social media, we could not calculate a response rate. The average time for survey completion for the study participants was 9 min.

Age, gender, ethnicity, marital status, job roles, area of residence and proportion of respondents redeployed to patient facing roles during the pandemic are presented in **Table 1** according to their status (single vs. in partnership vs. married). There were no significant differences between the three responder categories.

Impact of Respondents' Status (Single vs. in Partnership vs. Married) on Survey Outcomes

Self-reported job-satisfaction and satisfaction outside work prior (retrospective reporting) and during the COVID-19 pandemic (current reporting).

We explored the impact of respondents' status (single vs. in partnership vs. married) on job-satisfaction and satisfaction outside work pre and during COVID-19 pandemic (**Table 2**). Job enjoyment was perceived as higher pre COVID as opposed to during the first wave of the pandemic in the UK in all three status groups.

Individuals in each marital group recalled significantly higher levels of job enjoyment before the COVID-19 pandemic when compared to during the pandemic, irrespective of their marital status ($P < 0.0001$). No significant difference was found between each marital group at the same time point.

Married staff reported higher levels of job enjoyment than those who are single before the COVID-19 pandemic ($P =$

TABLE 1 | Responders' characteristics presented according to their status (single vs. in partnership vs. married) which was identified as a key determinant of COVID-19 pandemic impact).

Respondents' characteristics	Married	Single	Partnership	P-values
Number	197	94	74	-
Age				
18–25	0	8	2	
26–30	4	19	20	
31–40	56	32	27	
41–50	70	18	10	
51–60	48	15	11	
Over 60	19	2	4	
Age (mean)	47.10152	38.63298	39.28378	
Gender				Married vs. single: $P = 0.0005$
Female	118	74	55	
Male	79	19	19	Married vs. partnership: $P = 0.03$
Other	0	1	0	Single vs. partnership: $P = 0.57$
Ethnicity				Married vs. single: $P = 0.60$
White	132	60	63	
Non-white	65	34	11	Married vs. partnership: $P = 0.004$
				Single vs. partnership: $P = 0.002$
Area of residence				Married vs. single: $P = 0.17$
Urban	170	87	66	
Rural	27	7	8	Married vs. partnership: $P = 0.68$
				Single vs. partnership: $P = 0.59$
In a patient facing role				Married vs. single: $P = 0.54$
Yes	159	73	51	
No	38	21	23	Married vs. partnership: $P = 0.05$
				Single vs. partnership: $P = 0.22$
Redeployment to a patient facing role during COVID-19 pandemic				Married vs. single: $P = 0.41$
Yes	53	30	22	
No	144	64	52	Married vs. partnership: $P = 0.65$
				Single vs. partnership: $P = 0.87$

0.003). Regarding job enjoyment of staff before the COVID-19 pandemic, no significant difference was observed between married staff and staff in partnerships ($P = 0.45$), or between single staff and those in partnerships ($P = 0.15$). There was no observed difference between the marital groups in job enjoyment during the COVID-19 pandemic.

TABLE 2 | Self-reported job-enjoyment and satisfaction outside work prior (retrospective reporting) and during the COVID-19 pandemic (real-life reporting) are presented according to the responders' status (single vs. in partnership vs. married).

	Married	Single	In partnership	
Job enjoyment prior to COVID-19 pandemic (VAS 1–10) Mean (IQR)	7.589 (7.000–8.000)	7.021 (6.000–8.000)	7.243 (6.250–8.000)	Married vs. single: P = 0.003 Married vs. partnership: P = 0.45 Single vs. partnership: P = 0.15
Job enjoyment during COVID-19 pandemic (VAS 1–10) Mean (IQR)	5.513 (4.000–7.000)	5.351 (3.250–7.000)	5.514 (4.000–7.000)	Married vs. single: P = 0.54 Married vs. partnership: P = 0.78 Single vs. partnership: P = 0.57
Job enjoyment difference prior vs. during COVID-19 pandemic Mean (IQR)	2.076 (0.000–4.000)	1.670 (0.00–4.00)	1.730 (0.00–3.75)	Married vs. single: P = 0.37 Married vs. partnership: P = 0.32 Single vs. partnership: P = 0.92
Job enjoyment prior vs during COVID-19 pandemic	P < 0.0001	P < 0.0001	P < 0.0001	
Satisfaction outside work prior COVID-19 pandemic (VAS 1–10) Mean (IQR)	8.036 (7.000–9.000)	7.628 (7.000–9.000)	8.203 (8.000–9.000)	Married vs. single: P = 0.04 Married vs. partnership: P = 0.62 Single vs. partnership: P = 0.03
Satisfaction outside work during COVID-19 pandemic (VAS 1–10) Mean (IQR)	5.477 (4.000–7.000)	4.723 (3.000–7.000)	5.703 (4.000–7.000)	Married vs. single: P = 0.02 Married vs. partnership: P = 0.47 Single vs. partnership: P = 0.01
Satisfaction outside work difference prior vs during COVID-19 pandemic Mean (IQR)	2.558 (0.000–4.000)	2.904 (1.000–5.000)	2.500 (1.000–4.000)	Married vs. single: P = 0.28 Married vs. partnership: P = 0.86 Single vs. partnership: P = 0.28
Satisfaction outside work prior vs. during COVID-19 pandemic	P < 0.0001	P < 0.0001	P < 0.0001	

Bold values indicate $P < 0.05$.

Self-reported wellbeing, resilience and anxiety related to redeployment during the COVID-19 pandemic (current reporting).

We evaluated the impact of responders' status (single vs. in partnership vs. married) on wellbeing, resilience and anxiety related to redeployment during the COVID-19 pandemic (Table 3).

Married staff overall perceived their wellbeing as significantly higher than single members of staff and those in partnerships ($P = 0.002$, $P = 0.04$, respectively). There was no significant difference in the wellbeing of single staff vs. those in partnerships either ($P = 0.42$).

The perceived resilience of married staff was significantly higher than their single counterparts ($P = 0.0006$) or staff currently in partnership ($P = 0.04$). No significant difference was observed in the resilience between married staff and those who were single ($P = 0.25$).

Impact of Responders' Gender and Marital Status on Survey Outcomes

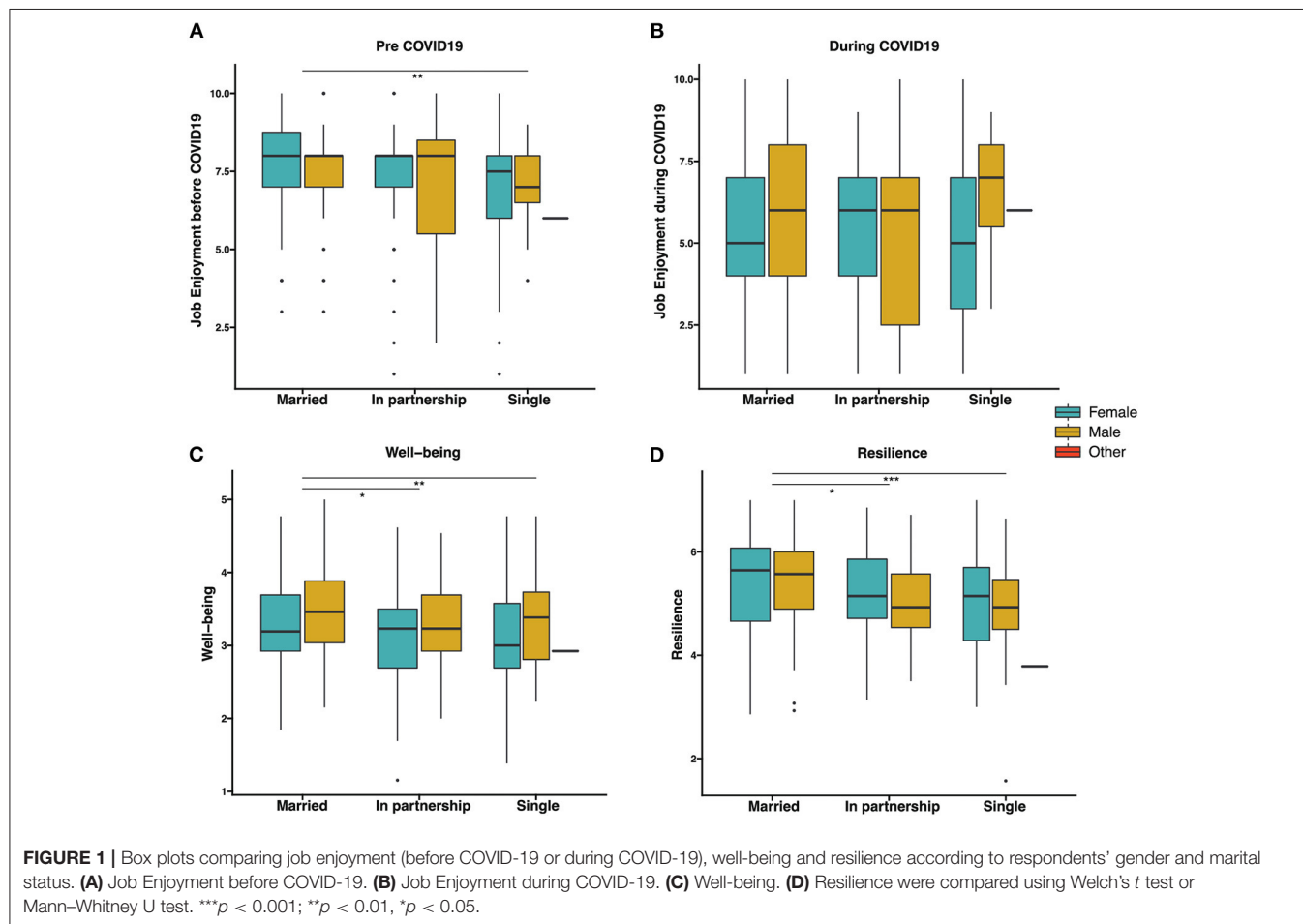
Married women had lower levels of self-reported wellbeing than married men, while there were no other gender differences between responders who were single and in partnership (Figure 1A). When looking at gender differences, married women reported lower levels of wellbeing when compared to married men ($P = 0.028$), and single females reported significantly lower levels of wellbeing than both married women and married men ($P = 0.017$ and $P < 0.0001$, respectively).

Married staff, irrespective of gender, perceived their resilience as significantly higher than staff who were single or in partnership. No differences were found in staff that are in partnerships vs. those who are single with regard to self-assessed resilience (Figure 1B). When considering the effect

TABLE 3 | Self-reported wellbeing, resilience and anxiety related to redeployment during the COVID-19 pandemic (real-life reporting) are presented according to the responders' status (married vs. single vs. in partnership).

	Married	Single	Partnership	
Redeployment-related anxiety during COVID-19 pandemic (VAS 1–10) Mean (IQR)	7.268 (6.000–8.000)	6.684 (5.000–8.000)	7.059 (6.000–8.000)	Married vs. single: $P = 0.36$ Married vs. partnership: $P = 0.55$ Partnership vs. single: $P = 0.74$
Wellbeing during COVID-19 pandemic (VAS 1–5) Mean (IQR)	3.357 (2.923–3.769)	3.097 (2.692–3.615)	3.180 (2.788–3.596)	Married vs. single: $P = 0.002$ Married vs. partnership: $P = 0.04$ Partnership vs. single: $P = 0.42$
Resilience during COVID-19 pandemic (VAS 1–7) Mean (IQR)	5.416 (4.714–6.071)	4.960 (4.304–5.643)	5.186 (4.643–5.786)	Married vs. single: $P = 0.0006$ Married vs. partnership: $P = 0.04$ Partnership vs. single: $P = 0.25$

Bold values indicate $P < 0.05$.



of gender, significant lower resilience was reported by single compared to married female staff ($P = 0.007$) or married male staff ($P = 0.011$).

Married staff perceived their job enjoyment as higher than those who were single. There were no significant differences between married staff and those who were in partnerships. No

significant differences were found between those who are single and those who are in partnerships (**Figure 1C**). No differences were found in job enjoyment post COVID for all marital groups (**Figure 1D**).

Survey Outcomes When Controlling for the Respondents' Marital Status

Regression analysis suggests that male respondents have a positive association with higher self-assessed wellbeing score compared to respondents with other genders ($p = 0.014$) disregard of their marital status. Interestingly, being female respondents have a significantly positive association ($P = 3.35 \times 10^{-5}$) higher satisfaction with time outside work before COVID-19 but this difference cannot be observed during the COVID-19. Moreover, by controlling marital status, respondents with age over 60 have a strong association with having a higher self-assessed wellbeing ($P = 0.032$) and resilience ($P = 0.003$).

Impact of Professional Role on Survey Outcomes

When looking at differences between staff in patient versus no patient facing roles, no clear difference can be observed in terms of job enjoyment, satisfaction outside work, well-being, resilience and redeployment-related anxiety between patient facing roles and no patient facing roles.

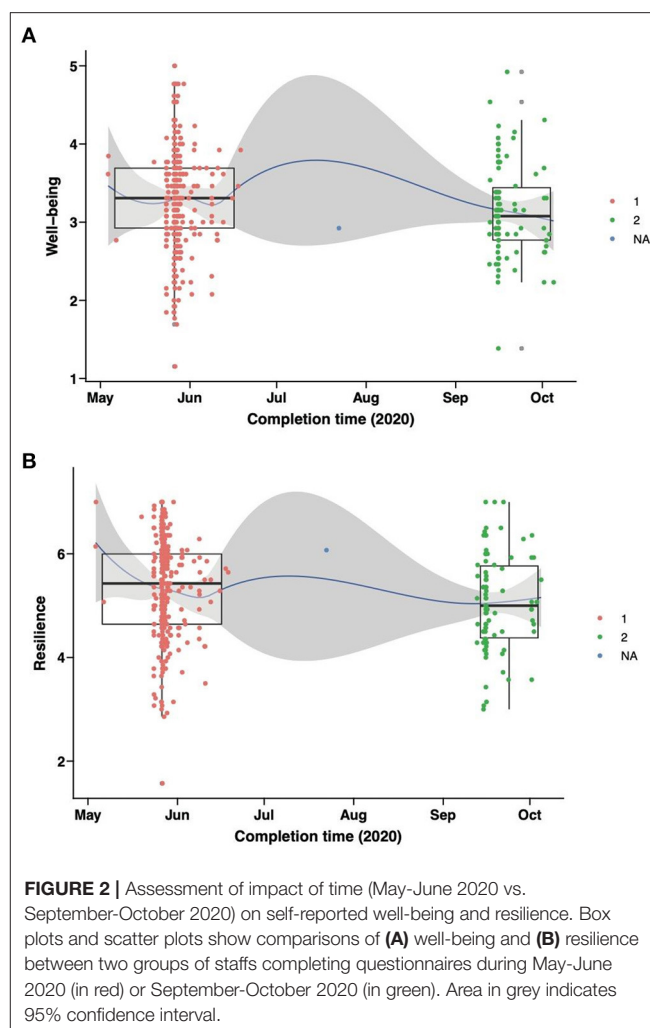
In our survey, there were 258 (71%) respondents who continued to provide modified service in their clinical specialty or for non-COVID-19 patients during the pandemic. The professional satisfaction for the modified service of respondents taking patient facing roles was significantly lower than those with non-patient facing responsibilities ($P = 0.019$). Tele-medicine was included in the provide modified clinical service of 176/365 survey respondents. Specifically, rheumatologists providing a tele-medicine service ($n = 38$) had significantly lower professional satisfaction for the modified service than other healthcare professional providing tele-medicine ($P = 0.007$), with the caveat of a much-reduced sample size.

Assessment of Impact of Time (May-June 2020 vs. September-October 2020) on Self-Reported Resilience and Wellbeing

Self-assessed wellbeing and resilience was measured over time for all survey respondents. As expected, the majority of the responses were collected when the survey went live (May 2020) and after a reminder to complete the survey was sent out via social media in September 2020). Self-assessed wellbeing in May 2020 was found to be significantly higher than that in September 2020 (3.308 vs. 3.077, $P = 0.045$) (**Figure 2A**). Similar result observed with significantly higher self-assessed resilience in May than that in September 2020 (5.429 vs. 5.000, $P = 0.014$) (**Figure 2B**).

DISCUSSION

Unsurprisingly, our research participants reported fall in job enjoyment during the COVID-19 pandemic, compared to their recall of pre-pandemic job enjoyment. This was a consistent



finding for all of the staff surveyed and echo similar findings in a number of international studies (41–43). One study conducted by the British Medical Association (BMA) found that 59% of doctors described their level of exhaustion from work during the pandemic as “higher than normal” in October 2020, despite the ease of the pandemic restriction (44). The participants in our survey had rated work fulfillment and recognition highly in the first wave of the COVID-19 pandemic which could explain the perceived increase in job satisfaction, whereas other publication provided evidence that doctors in the UK rated their feelings of being valued for their work during the pandemic quite low: 2.84 out of 5 (44). This disparity in perceived work recognition may be a factor influencing differences in job satisfaction globally. Other explanations for low job satisfaction in HCWs during the pandemic were perceived job inequalities (45), type of work environment (hospital vs. community) (43), as well as individual factors such as emotional intelligence (46). Interestingly, we did not find any differences between different professional roles, suggesting that the COVID-19 pandemic affected staff beyond the daily jobs. This may reflect the chronic occupational stress in university workers (47) in relation to various factors such as

family-work balance and academic burnout (48, 49), accentuated by the additional psychological stress related to the teaching and academic life disruptions in the context of COVID-19 pandemic (50).

There have been limited research on the relationship between job satisfaction and marital status both during and before the pandemic. In this study, married HCWs recalled higher levels of pre-pandemic job enjoyment than single staff. However, this is clearly not a universal pattern, as a similarly designed study in Laos found no significant difference between married and single HCWs (51). Conversely, our results showed no significant difference between the job enjoyment of married staff and single staff during the pandemic, which contrasts with a study from Vietnam which found that married staff working closer to patients during the COVID-19 pandemic had a higher job satisfaction (52). These discrepancies suggest that, when the research is targeting staff support in a particular country or health care system, then comparisons between vast regions of the world may not be very meaningful, if at all. On the other hand, if the purpose of the research is to study the macro conditions affecting health care staff wellbeing, then it is useful to identify regional differences in staff experience.

The relationship between marital status and wellbeing is more consistent across the existent literature (19, 21, 22), with the general trend of lower rates of wellbeing for single HCWs. Our survey also found that married individuals had higher rates of wellbeing than those in a partnership. This could be potentially explained by the increased likelihood of married responders to live with their partner than those in a relationship, especially in the context of quarantine restrictions associated with the COVID-19 pandemic, providing them an easier access to social support. Social support has also shown to be a protective factor for mental health in HCWs during the pandemic (53). Female responders, regardless of marital status perceived their wellbeing as lower than their male counterparts during the COVID-19 pandemic (6–8, 11, 16–18, 20). Our study also provided evidence that single females self-reported lower levels of wellbeing when compared to married women and men alike, similarly to another study from Italy (19).

Married HCWs in our study also rated their resilience more highly than both single HCWs and those in partnerships. Whilst there have not been previous studies comparing the resilience of HCWs in a partnership with those who were married during the pandemic, previous studies comparing married to single HCWs generated contrasting results. A study in Spain (54) and one in Iran (55) found that married HCWs had higher scores of resilience during the COVID-19 pandemic, whereas a study in Italy (56) did not find a significant difference between single and married HCWs.

Complementary to previous studies (9, 14–18), our results have found that during the pandemic, the wellbeing scores were influenced by the age of the responders, with the younger HCWs reporting lower scores. Our results also found that the reported resilience scores increased with age— an area which has had little prior exploration. One previous study found age to be the most important factor in determining resilience during the pandemic, above having children, occupation and gender, respectively (57). It was postulated that this is likely explained

by the advantage of age-related experience in providing coping skills for managing emotionally challenging incidents and this theory is supported by another study which tested age and relevant experience independently (54). They found that while experience was associated with increased scores of resilience, age when tested independently to experience, was not, and future studies should aim to explore the relationship between these two factors. Another important concept for making sense of differential experiences is loss, in terms of meaningful and valued activities and relationships that is integral to life satisfaction and support identities. As well as having had less life experiences to grow resilience and coping capacity, the COVID-19 pandemic may have brought greater losses to younger people in general and younger HCWs in particular. Another psychological variable of interest is perceived control in work and outside work.

Interestingly, one factor which led to no significant differences in job enjoyment, satisfaction outside work, wellbeing, resilience and redeployment-related anxiety, was the staff's type of role: e.g., patient vs. non-patient facing occupational role during the pandemic. While this seems counterintuitive as most of the previous research suggested that increased exposure to COVID-19 pandemic decreases psychological wellbeing (5, 7, 9, 10, 18, 27), there have been a number of studies showing non-clinical staff to have lower wellbeing scores than HCWs (17, 31, 42, 58). The authors suggested that the unbalanced degrees of preparation for and support through the pandemic, could be a possible explanation for the low wellbeing scores reported by staff not directly involved in managing the pandemic.

A large proportion of our non-patient facing participants were university staff and a previous study in the US reported that staff working in academia reported a reduction in well-being since the start of the COVID-19 pandemic, however in their study the wellbeing scores were higher than those reported by the clinical staff (25). In contrast, while our study did not find patient facing HCWs to have generally lower satisfaction, we did find that HCWs in patient facing roles had lower satisfaction for modified services such as telemedicine, and this was particularly relevant for rheumatologists. This may be due to the nature of systemic manifestations looked after during rheumatological consultations, which are difficult to manage remotely, and has also been significantly affected by the survey selection bias (the survey was led by rheumatologists who have been better represented in the sample size) Another study found that 71% of telephone consultations with rheumatologists reached the same diagnostic conclusion as a face-to-face appointment, in comparison to 97% of video call consultations (59).

Furthermore, our results bring attention to the fact that wellbeing and resilience of HCWs working in the UK decreased from May 2020 to November 2020 and previous international studies have found similar results. One global meta-analysis (60) confirmed that the pooled prevalence of anxiety in HCWs during Jan-March 2020, April-June 2020 and July-Sep 2020 increased from 30 to 48% and 60.79%, respectively and the prevalence for depression during the same time periods also escalated from 32.5 to 39.62% and 46.88%, respectively. Another study in Russia (26) found that anxiety in HCWs was higher during their second peak (Oct 2020) in comparison to their first peak (May 2020) of the pandemic. As expected, these results suggest that the increased

duration of the pandemic led to poorer outcomes, however, further studies are required to appreciate if this is a long-term effect. It is unsurprising that our study found both resilience and wellbeing to decrease over time as previous research confirms a positive correlation between resilience and wellbeing scores in HCWs during the pandemic (57, 61). High resilience may serve as a protective factor against emotional distress, as one study found that when satisfaction increased, resilience also increased (57), providing insight into how HCW and other staff wellbeing can be improved during challenging periods of time. An alternative hypothesis is that resilience is mood-related, so that people may feel and report greater resilience when there is an uplift to mood, and vice versa. This suggests that it is important to measure resilience by also asking about resilient behaviors and not just perceptions.

The current study adds to the growing literature regarding the effects of the COVID-19 pandemic on the mental health of HCWs and university staff. There is currently limited information on how resilience and job satisfaction of HCWs and university staff working in the field of healthcare and healthcare research have been affected by the COVID-19 pandemic in the UK. Previous studies have not explored some of the variables we investigated here, such as comparison between being married vs. in partnership or performed a parallel evaluation of wellbeing, resilience and job satisfaction. The strength of our survey study is in the hypotheses generated for future research which, as well as focus on work-related variables (e.g., frontline, risk perceptions), should also focus on gender and age differences as these could differentially affect people's capacity to maintain meaningful relationships and a sense of control and how they experience the gains and losses as a result of drastic changes to life. Having a more specific understanding of factors likely to influence mental health outcomes and other aspects related to job satisfaction and life satisfaction more generally will hopefully allow for more effective planning of targeted interventions to support HCWs and staff working in various other professional areas during future pandemics and other health care crises.

LIMITATIONS

The survey was cross-sectional and did not look for changes in parameters assessed over time. It has mainly been disseminated across social media platforms and through staff emails within the departments of researchers. Therefore, selection bias can be expected. For example, the survey is likely to have missed participants that do not use/have access to social media. There was also a likely recall bias due to the retrospective nature of part of the survey, which asked individuals to think back to how they felt prior to COVID-19 pandemic. Other limitations of this study include the reduced numbers of junior staff and participants between within the age range 18–25, and the focus on one urban geographical area, as 77.7% of respondents worked in London during the COVID-19 pandemic. The job satisfaction has not been measured simply on a VASM rather than using a composite measure likely to capture more adequately the various factors

contributing to work satisfaction. We were also unable to control for many other potential confounding factors, such as living alone or not during the pandemic, irrespective of the marital status, living with/caring for children, having access to network support at home or at work, or the type of professional role (as the respondents were spread across too many roles to enable a meaningful statistical analysis). The significant research and professional fatigue affecting HCWs and university staff during the COVID-19 pandemic, prevented a longer/ more granular survey design.

CONCLUSION

Our study highlights a reduction in satisfaction scores of HCWs during the pandemic, in comparison to retrospective pre-pandemic scores, which affected disproportionately single staff. Being younger, female or in a patient facing role was also associated with poorer outcomes. Furthermore, we identified that wellbeing and resilience in HCWs decreased over time during the 2020 waves of the pandemic in the UK. These results can be used to support tailored interventions for categories of staff more at risk of poorer outcomes or to predict which individuals may be at higher risk in the case of future pandemics.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by UK Health Research Authority approval, reference: 20/HRA/2547. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

CC, WW, PM, and JH designed the survey. CC and WW gained the study ethical approval. WW, PM, AK, LH, JH, and CC coordinated the survey dissemination and data collection. JP performed the study analysis. JP, WW, GD, NC, PM, AK, and CC wrote the first draft of the manuscript. All authors reviewed the manuscript, provided intellectual input in the study analysis and presentation of findings, and approved the final version of the manuscript.

FUNDING

This work was supported by grants from the NIHR UCLH Biomedical Research Center grant BRC772/III/EJ/101350, BRC773/III/CC/101350 and was performed within the Center for Adolescent Rheumatology Versus Arthritis at UCL UCLH and GOSH supported by grants from Versus Arthritis (21593, 22908, and 20164).

ACKNOWLEDGMENTS

Special thanks to Prof. David Leon, Department of Epidemiology, London School of Hygiene and Tropical Medicine, London, UK for his helpful comments.

REFERENCES

1. *Worldometers.info. COVID Live Update.* (2021). Available online at: <https://www.worldometers.info/coronavirus/#countries>
2. Statistics OFN. *Coronavirus and Depression in Adults, Great Britain: July to August 2021 Great Britain - Office for National Statistics.* London: National Institute of Statistics (2021).
3. Weinberg A, Creed F. Stress and psychiatric disorder in healthcare professionals and hospital staff. *Lancet.* (2000) 355:533–7. doi: 10.1016/S0140-6736(99)07366-3
4. Wall TD, Bolden RI, Borrill CS, Carter AJ, Golya DA, Hardy GE, et al. Minor psychiatric disorder in NHS trust staff: occupational and gender differences. *Br J Psychiatry.* (1997) 171:519–23. doi: 10.1192/bjp.171.6.519
5. Olaya B, Perez-Moreno M, Bueno-Notivol J, Gracia-Garcia P, Lasheras I, Santabarbara J. Prevalence of depression among healthcare workers during the covid-19 outbreak: a systematic review and meta-analysis. *J Clin Med.* (2021) 10:3406. doi: 10.3390/jcm10153406
6. Bahamdan AS. Review of the psychological impact of COVID-19 pandemic on healthcare workers in Saudi Arabia. *Risk Manag Healthc Policy.* (2021) 14:4105–11. doi: 10.2147/RMHP.S324938
7. Norhayati MN, Che Yusof R, Azman MY. Prevalence of psychological impacts on healthcare providers during COVID-19 pandemic in Asia. *Int J Environ Res Public Health.* (2021) 18:9157. doi: 10.3390/ijerph18179157
8. Ching SM, Ng KY, Lee KW, Yee A, Lim PY, Ranita H, et al. Psychological distress among healthcare providers during COVID-19 in Asia: systematic review and meta-analysis. *PLoS ONE.* (2021) 16:e0257983. doi: 10.1371/journal.pone.0257983
9. Smallwood N, Karimi L, Bismark M, Putland M, Johnson D, Dharmage SC, et al. High levels of psychosocial distress among Australian frontline healthcare workers during the COVID-19 pandemic: a cross-sectional survey. *Gen Psychiatr.* (2021) 34:e100577. doi: 10.1136/gpsych-2021-100577
10. Laukkala T, Suvisaari J, Rosenstrom T, Pukkala E, Junttila K, Haravuori H, et al. COVID-19 pandemic and helsinki university hospital personnel psychological well-being: six-month follow-up results. *Int J Environ Res Public Health.* (2021) 18:2524. doi: 10.3390/ijerph18052524
11. Miguel-Puga JA, Cooper-Bribiesca D, Avelar-Garnica FJ, Sanchez-Hurtado LA, Colin-Martinez T, Espinosa-Poblano E, et al. Burnout, depersonalization, and anxiety contribute to post-traumatic stress in frontline health workers at COVID-19 patient care, a follow-up study. *Brain Behav.* (2021) 11:e02007. doi: 10.1002/brb3.2007
12. Naser AY, Dahmash EZ, Al-Rousan R, Alwafi H, Alrawashdeh HM, Ghoul I, et al. Mental health status of the general population, healthcare professionals, and university students during 2019 coronavirus disease outbreak in Jordan: A cross-sectional study. *Brain Behav.* (2020) 10:e01730. doi: 10.1002/brb3.1730
13. Vanhaecht K, Seys D, Bruyneel L, Cox B, Kaesemans G, Cloet M, et al. COVID-19 is having a destructive impact on health-care workers' mental well-being. *Int J Qual Health Care.* Oxford: Oxford University Press (2021). doi: 10.1093/intqhc/mzaa158
14. Mattila E, Peltokoski J, Neva MH, Kaunonen M, Helminen M, Parkkila AK. COVID-19: anxiety among hospital staff and associated factors. *Ann Med.* (2021) 53:237–46. doi: 10.1080/07853890.2020.1862905
15. Stubbs JM, Achat HM, Schindler S. Detrimental changes to the health and well-being of healthcare workers in an Australian COVID-19 hospital. *BMC Health Serv Res.* (2021) 21:1002. doi: 10.1186/s12913-021-07013-y
16. Osorio FL, Silveira ILM, Pereira-Lima K, Crippa JAS, Hallak JEC, Zuairi AW, et al. Risk and protective factors for the mental health of brazilian healthcare workers in the frontline of COVID-19 pandemic. *Front Psychiatry.* (2021) 12:662742. doi: 10.3389/fpsy.2021.662742

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2022.928107/full#supplementary-material>

17. Hennein R, Mew EJ, Lowe SR. Socio-ecological predictors of mental health outcomes among healthcare workers during the COVID-19 pandemic in the United States. *PLoS ONE.* (2021) 16:e0246602. doi: 10.1371/journal.pone.0246602
18. Pappa S, Sakka N, Sakka E. A year in review: sleep dysfunction and psychological distress in healthcare workers during the COVID-19 pandemic. *Sleep Med.* (2022) 91:237–45. doi: 10.1016/j.sleep.2021.07.009
19. Di Tella M, Romeo A, Benfante A, Castelli L. Mental health of healthcare workers during the COVID-19 pandemic in Italy. *J Eval Clin Pract.* (2020) 26:1583–7. doi: 10.1111/jep.13444
20. Maciaszek J, Ciulkowicz M, Misiak B, Szczesniak D, Luc D, Wiecek T, et al. Mental health of medical and non-medical professionals during the peak of the COVID-19 pandemic: a cross-sectional nationwide study. *J Clin Med.* (2020) 9:2527. doi: 10.3390/jcm9082527
21. Da Rosa P, Brown R, Pravecek B, Carotta C, Garcia AS, Carson P, et al. Factors associated with nurses emotional distress during the COVID-19 pandemic. *Appl Nurs Res.* (2021) 62:151502. doi: 10.1016/j.apnr.2021.151502
22. Woon LS, Sidi H, Nik Jaafar NR, Leong Bin Abdullah MFI. Mental health status of university healthcare workers during the COVID-19 pandemic: a post-movement lockdown assessment. *Int J Environ Res Public Health.* (2020) 17:9155. doi: 10.20944/preprints202011.0422.v1
23. Ghaleb Y, Lami F, Al Nsour M, Rashak HA, Samy S, Khader YS, et al. Mental health impacts of COVID-19 on healthcare workers in the Eastern Mediterranean Region: a multi-country study. *J Public Health.* (2021) 43(Suppl 3):iii34–42. doi: 10.1093/pubmed/fdab321
24. Holton S, Wynter K, Trueman M, Bruce S, Sweeney S, Crowe S, et al. Psychological well-being of Australian hospital clinical staff during the COVID-19 pandemic. *Aust Health Rev.* (2021) 45:297–305. doi: 10.1071/AH20203
25. Evanoff BA, Strickland JR, Dale AM, Hayibor L, Page E, Duncan JG, et al. Work-related and personal factors associated with mental well-being during the COVID-19 response: survey of health care and other workers. *J Med Internet Res.* (2020) 22:e21366. doi: 10.2196/21366
26. Mosolova E, Sosin D, Mosolov S. Stress, anxiety, depression and burnout in frontline healthcare workers during two peaks of COVID-19 pandemic in Russia. *Psychiatry Res.* (2021) 306:114226. doi: 10.1016/j.psychres.2021.114226
27. Giardino DL, Huck-Iriart C, Riddick M, Garay A. The endless quarantine: the impact of the COVID-19 outbreak on healthcare workers after three months of mandatory social isolation in Argentina. *Sleep Med.* (2020) 76:16–25. doi: 10.1016/j.sleep.2020.09.022
28. Gillean J, Santaolalla A, Valdearenas L, Salice C, Fuste M. Impact of the COVID-19 pandemic on the mental health and well-being of UK healthcare workers. *BJPsych Open.* (2021) 7:e88. doi: 10.1192/bjo.2021.42
29. Li Z, Ge J, Yang M, Feng J, Qiao M, Jiang R, et al. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain Behav Immun.* (2020) 88:916–9. doi: 10.1016/j.bbi.2020.03.007
30. Wu Y, Wang J, Luo C, Hu S, Lin X, Anderson AE, et al. A Comparison of burnout frequency among oncology physicians and nurses working on the frontline and usual wards during the COVID-19 epidemic in Wuhan, China. *J Pain Symptom Manage.* (2020) 60:e60–5. doi: 10.1016/j.jpainsymman.2020.04.008
31. Tan BYQ, Chew NWS, Lee GKH, Jing M, Goh Y, Yeo LLL, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med.* (2020) 173:317–20. doi: 10.7326/M20-1083
32. Yadeta TA, Dessie Y, Balis B. Magnitude and predictors of health care workers depression during the COVID-19 pandemic: health

- facility-based study in Eastern Ethiopia. *Front Psychiatry*. (2021) 12:654430. doi: 10.3389/fpsy.2021.654430
33. Luthar SS, Cicchetti D. The construct of resilience: implications for interventions and social policies. *Dev Psychopathol*. (2000) 12:857–85. doi: 10.1017/S0954579400004156
 34. Baskin RG, Bartlett R. Healthcare worker resilience during the COVID-19 pandemic: an integrative review. *J Nurs Manag*. (2021) 29:2329–42. doi: 10.1111/jonm.13395
 35. Barzilay R, Moore TM, Greenberg DM, DiDomenico GE, Brown LA, White LK, et al. Resilience, COVID-19-related stress, anxiety and depression during the pandemic in a large population enriched for healthcare providers. *Transl Psychiatry*. (2020) 10:291. doi: 10.1038/s41398-020-00982-4
 36. Lyu H, Yao M, Zhang D, Liu X. The relationship among organizational identity, psychological resilience and work engagement of the first-line nurses in the prevention and control of COVID-19 based on structural equation model. *Risk Manag Healthc Policy*. (2020) 13:2379–86. doi: 10.2147/RMHP.S254928
 37. Tennant R, Hiller L, Fishwick R, Platt S, Joseph S, Weich S, et al. The warwick-edinburgh mental well-being scale (WEMWBS): development and UK validation. *Health Qual Life Outcomes*. (2007) 5:63. doi: 10.1186/1477-7525-5-63
 38. Wagnild GM, Young HM. Development and psychometric evaluation of the Resilience Scale. *J Nurs Meas*. (1993) 1:165–78.
 39. Damasio BF, Borsa JC, da Silva JP. 14-item resilience scale (RS-14): psychometric properties of the Brazilian version. *J Nurs Meas*. (2011) 19:131–45. doi: 10.1891/1061-3749.19.3.131
 40. Nagy M. Using a single-item approach to measure facet job satisfaction. *Occup Organ Psychol*. (2002) 75:77–86. doi: 10.1348/096317902167658
 41. Zhang SX, Liu J, Afshar Jahanshahi A, Nawaser K, Yousefi A, Li J, et al. At the height of the storm: healthcare staff's health conditions and job satisfaction and their associated predictors during the epidemic peak of COVID-19. *Brain Behav Immun*. (2020) 87:144–6. doi: 10.1016/j.bbi.2020.05.010
 42. Zhang R, Hou T, Kong X, Wang G, Wang H, Xu S, et al. PTSD among healthcare workers during the COVID-19 outbreak: a study raises concern for non-medical staff in low-risk areas. *Front Psychiatry*. (2021) 12:696200. doi: 10.3389/fpsy.2021.696200
 43. Said RM, El-Shafei DA. Occupational stress, job satisfaction, and intent to leave: nurses working on front lines during COVID-19 pandemic in Zagazig City, Egypt. *Environ Sci Pollut Res Int*. (2021) 28:8791–801. doi: 10.1007/s11356-020-11235-8
 44. BMA. COVID-19: Analysing the Impact of Coronavirus on Doctors. (2020). Available online at: <https://www.bma.org.uk/advice-and-support/covid-19/what-the-bma-is-doing/covid-19-bma-actions-and-policy/covid-19-analysing-the-impact-of-coronavirus-on-doctors> (accessed May 24, 2022).
 45. Gimenez-Espert MDC, Prado-Gasco V, Soto-Rubio A. Psychosocial risks, work engagement, and job satisfaction of nurses during COVID-19 pandemic. *Front Public Health*. (2020) 8:566896. doi: 10.3389/fpubh.2020.566896
 46. Soto-Rubio A, Gimenez-Espert MDC, Prado-Gasco V. Effect of emotional intelligence and psychosocial risks on burnout, job satisfaction, and nurses' health during the COVID-19 pandemic. *Int J Environ Res Public Health*. (2020) 17:7998. doi: 10.3390/ijerph17217998
 47. Mark G, Smith AP. Effects of occupational stress, job characteristics, coping, and attributional style on the mental health and job satisfaction of university employees. *Anxiety Stress Coping*. (2012) 25:63–78. doi: 10.1080/10615806.2010.548088
 48. Jerg-Bretzke L, Limbrecht-Ecklundt K, Walter S, Spohrs J, Beschoner P. Correlations of the “work-family conflict” with occupational stress—a cross-sectional study among university employees. *Front Psychiatry*. (2020) 11:134. doi: 10.3389/fpsy.2020.00134
 49. Hao Z, Jin L, Huang J, Lyu R, Cui Q. Academic burnout and problematic smartphone use during the COVID-19 pandemic: the effects of anxiety and resilience. *Front Psychiatry*. (2021) 12:725740. doi: 10.3389/fpsy.2021.725740
 50. Besser A, Lotem S, Zeigler-Hill V. Psychological stress and vocal symptoms among university professors in israel: implications of the shift to online synchronous teaching during the COVID-19 pandemic. *J Voice*. (2022) 36:291.e9–16. doi: 10.1016/j.jvoice.2020.05.028
 51. Khamlub S, Harun-Or-Rashid M, Sarker MA, Hirose T, Outavong P, Sakamoto J. Job satisfaction of health-care workers at health centers in vientiane capital and bolikhamxai province, Lao PDR. *Nagoya J Med Sci*. (2013) 75:233–41.
 52. Thai TT, Le TAT, Truong LTT, Le NH, Huynh QNH, Nguyen TV, et al. Care for the carers: an evaluation of job satisfaction of community healthcare workers in charge of infectious disease prevention and control in Vietnam. *Risk Manag Healthc Policy*. (2021) 14:2831–9. doi: 10.2147/RMHP.S321314
 53. Muller AE, Hafstad EV, Himmels JPW, Smedslund G, Flottorp S, Stensland SO, et al. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: a rapid systematic review. *Psychiatry Res*. (2020) 293:113441. doi: 10.1016/j.psychres.2020.113441
 54. Sanchez-Zaballos M, Mosteiro-Diaz MP. Resilience among professional health workers in emergency services. *J Emerg Nurs*. (2021) 47:925–32.e2. doi: 10.1016/j.jen.2020.07.007
 55. Yusefi AR, Faryabi R, Bordbar S, Daneshi S. Job burnout status and its relationship with resilience level of healthcare workers during Covid-19 pandemic: a case of Southern Iran. *Iran J Health Sci*. (2021) 9:1–11. doi: 10.18502/jhs.v9i3.7305
 56. Di Trani M, Mariani R, Ferri R, De Berardinis D, Frigo MG. From resilience to burnout in healthcare workers during the COVID-19 emergency: the role of the ability to tolerate uncertainty. *Front Psychol*. (2021) 12:646435. doi: 10.3389/fpsy.2021.646435
 57. Bozdag F, Ergun N. Psychological resilience of healthcare professionals during COVID-19 pandemic. *Psychol Rep*. (2021) 124:2567–86. doi: 10.1177/0033294120965477
 58. Styra R, Hawryluck L, Mc Geer A, Dimas M, Sheen J, Giacobbe P, et al. Surviving SARS and living through COVID-19: Healthcare worker mental health outcomes and insights for coping. *PLoS ONE*. (2021) 16:e0258893. doi: 10.1371/journal.pone.0258893
 59. Gkrouzman E, Wu DD, Jethwa H, Abraham S. Telemedicine in rheumatology at the advent of the COVID-19 pandemic. *HSS J*. (2020) 16: 108–11. doi: 10.1007/s11420-020-09810-3
 60. Mahmud S, Hossain S, Mueyed A, Islam MM, Mohsin M. The global prevalence of depression, anxiety, stress, and, insomnia and its changes among health professionals during COVID-19 pandemic: a rapid systematic review and meta-analysis. *Heliyon*. (2021) 7:e07393. doi: 10.1016/j.heliyon.2021.e07393
 61. Lin J, Ren YH, Gan HJ, Chen Y, Huang YE, You XM. Factors associated with resilience among non-local medical workers sent to Wuhan, China during the COVID-19 outbreak. *BMC Psychiatry*. (2020) 20:417. doi: 10.1186/s12888-020-02821-8

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Job Crafting and Nurses' Presenteeism: The Effects of Job Embeddedness and Job Irreplaceability

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OPEN ACCESS

Edited by:

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Reviewed by:

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Specialty section:

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

Received: 27 April 2022

Accepted: 06 June 2022

Published: 28 June 2022

Citation:

Liu T, Wang W, Shan G, Zhang Y, Liu J
and Li Y (2022) Job Crafting and
Nurses' Presenteeism: The Effects of
Job Embeddedness and Job
Irreplaceability.
Front. Public Health 10:930083.
doi: 10.3389/fpubh.2022.930083

Background: Presenteeism is defined as the behavior of people who insist on attending work despite complaints of ill health that should prompt rest and absence from work. Due to the heavy workloads and irreplaceable duties of the nursing service, nurses are a typical representative group suffering from presenteeism. Although more scholars have recently begun focusing on presenteeism, an abundant number of studies have tended to focus on presenteeism's external objective factors. There is, thus, a lack of studies based on variables related to the intra-individual initiative. This study aimed to address this gap by exploring the relationship between job crafting and nurses' presenteeism from the perspective of the individual internal initiative. Furthermore, this study also aimed to examine job embeddedness' mediating effect and job irreplaceability's moderating effect on presenteeism.

Methods: A total of 900 nurses from a 3A-graded hospital in Henan Province were invited to participate in the online study in October, November, and December 2021, respectively. Participants were asked to complete Self-report scales on job crafting, job embeddedness, job irreplaceability, and presenteeism at three time points above. Job crafting was measured at Time 1, job embeddedness and job irreplaceability were measured at Time 2, and presenteeism was measured at Time 3.

Results: Presenteeism was significantly associated with differences in participants' age and tenure. Job crafting was significantly positively associated with job embeddedness, and job embeddedness was significantly negatively correlated with presenteeism. Job embeddedness mediated the relationship between job crafting and presenteeism. Job irreplaceability moderated the relationship between job embeddedness and presenteeism.

Conclusions: This study explored job crafting's influence mechanism on nurses' presenteeism, which is beneficial to providing effective suggestions for managing and preventing the incidence of nurses' presenteeism. Future research should consider expanding the sampling area and enriching the occupational fields of included participants to conduct a more in-depth discussion on the relationship between job crafting and nurses' presenteeism.

Keywords: presenteeism, job crafting, job embeddedness, job irreplaceability, nurse

INTRODUCTION

Presenteeism is defined as the behavior of people who insist on attending work despite complaints of ill health that should prompt rest and absence from work (1). Compared to other occupational groups, nurses face a heavier workload, higher work irreplacability, and poorer health status (2). Therefore, they are often regarded by scholars as a group with a high incidence of presenteeism (3). Previous studies indicate that 82.08% of nurses have worked while sick from the perspective of the direct leader of nurses, and the proportion of nurses who Self-reported experiencing presenteeism was as high as 94.25% (4). With the COVID-19 pandemic, healthcare workers experience unprecedented challenges (5). It presented exceeding workloads for healthcare workers, which not only increased nurses' work stress and exhaustion (6, 7) but also caused delays and avoidance of medical care worldwide (8, 9). Under such circumstances, nurses' physical and mental health was damaged (6), and the phenomenon of nurses working with ill health also increased to a great extent.

From the personal health perspective, the recovery theory indicated that individuals with ill health need certain resources to recover, such as temporary rest or staying away from work (10). Presenteeism deprives individuals' opportunity to recover from stress and illness, not only reducing the acquisition of recovery resources but causing further deterioration of health conditions and long-term damage to physical and mental health. Empirical studies also showed that nurses' presenteeism can cause cumulated fatigue and stress, lead to impaired physical and mental health (11–13), and further intensify their job burnout (14), Self-depletion (15), and depersonalization symptoms (16). From the social aspect, monetary losses are also experienced by the healthcare organization due to presenteeism (17). Shan et al. (4) found that there were ¥4.38 billion and ¥2.88 billion in annual losses, respectively, according to nurses' and chief nurses' presenteeism reports. Therefore, to avoid a series of negative outcomes, it is necessary to focus on preventing and reducing the occurrence of nurse presenteeism.

Most previous studies have explored factors related to the aspects of work, such as leadership, colleagues, and organizations, to combat presenteeism (18–20). These are objective and stable, seldom involving factors related to personal initiative. With the coming of the digital network and intelligence era, human initiative plays an increasingly important role in social development and construction, which can prompt individuals to actively seek out work resources to effectively cope with potential work pressures and demands. This active resource-seeking behavior is called "job crafting" in the organizational management field. Specifically, job crafting is defined as the behavior of employees who spontaneously and proactively adjust job requirements and resources to achieve a better person-job fit, thereby increasing the meaning and experience of work (21).

According to the Job Demands-Resources Model (22), the resources that employees obtained through job crafting may help individuals to cope with job demands. Yi and Kim (23) pointed out that job crafting as an initiative behavior is a

key factor influencing presenteeism. However, the relationship between job crafting and presenteeism still needs to be clarified through further empirical research. Only one Danish scholar has explained the motivation behind people's choice of presenteeism from the perspective of job crafting and suggested the necessity of exploring the relationship between job crafting and presenteeism (24). Hence, this study aimed to address this gap and further investigate job crafting's influence mechanism on nurses' presenteeism. It is conducive to explaining the occurrence mechanism of nurses' presenteeism so that effective suggestions could be provided for preventing nurses' presenteeism based on it. It also contributes to investigating the relationship between job crafting and negative organizational behavior (presenteeism), which can enrich the research on the outcome variables of job crafting.

In the healthcare industry, nurses with a high job crafting level may actively communicate and collaborate with others to seek more resources and support, which may deepen their connection with others and embeddedness in the organization, thus, creating a strong sense of belonging (25). High organization embeddedness may promote pro-organizational behaviors, promoting unwillingness to damage the organization's interests. Presenteeism behavior has always been regarded as a negative organizational behavior due to the loss of organizational performance in the long run (26). Consequently, to maintain the organization's interests, nurses with high embeddedness may avoid actions with the potential to damage organizational performance, such as presenteeism. Based on this view, job crafting may reduce presenteeism by increasing the level of job embeddedness.

Existing research indicates that job demand is a vital antecedent for presenteeism (23). High job irreplacability is usually associated with heavy work demands, such as high difficulty and high technical requirements, which will put pressure on nurses (27), cause more health problems (2), and thus increase presenteeism behavior. Nurses with high job embeddedness are associated with more social and skill resources (28), which can effectively address high job irreplacability's negative impact, thereby reducing the incidence of presenteeism. Conversely, for low job embeddedness, due to the lack of effective resources, nurses' stress might be increased when faced with high job irreplacability, resulting in more health risks and presenteeism behaviors (29).

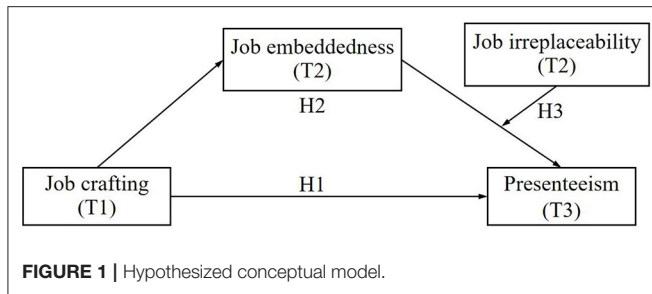
In summary, this study built a moderated mediation model to explore the relationship mechanism between job crafting and nurses' presenteeism. Specifically, this study examined the mediating role of job embeddedness on the relationship between job crafting and nurses' presenteeism and further explored the moderating role of job irreplacability between job embeddedness and nurses' presenteeism. The hypothesized model is shown in **Figure 1**.

THEORY AND HYPOTHESES

Job Crafting and Presenteeism

When individuals are sub-healthy, additional physical and psychological resources are required to face the heavy and complex nursing work. Furthermore, when nurses must work

Abbreviations: NPQ, nurse presenteeism questionnaire.



whilst unhealthy, prime resources would be consumed, resulting in a shortage of overall coping resources. If the lack of overall resources is not adequately restored in time, an imbalance in various bodily functions may result. If this situation continues, the individual's physical and mental health will be impacted to a greater extent (30).

Job crafting is defined as employees' behavior in actively changing their job design and perceptions to improve their sense of work meaning and maintain a better person-job fit (21). Leana et al. (31) highlighted that nurses would proactively search for a range of support resources from their manager and organization in the process of job crafting through various ways, such as organizational training, benefit programs, and leadership or colleague information sharing. According to the Conservation of Resources (COR) theory and Job Demands-Resources Model (JDR) (22), individuals seek to protect and promote their resources, such as objects, conditions, personal characteristics, energy, etc. (32). Perception of resource loss and threat to resources can result in stress responses (33). Oppositely, abundant work resources could assist nurses in coping with potential work demands, relieve work pressure, and reduce the consumption of physical and mental resources, thereby reducing the occurrence of presenteeism. Simultaneously, nurses could gain more capital and reinforced support from work resources to address the loss of performance or other adverse impacts caused by absence from work, so that if ill health occurs, they may tend to choose sick leave instead of presenteeism (28, 34). Therefore, we put forward the following hypothesis:

Hypothesis 1: *Job crafting has a negative effect on nurses' presenteeism.*

Mediation Effects of Job Embeddedness

Job crafting is a process meant to obtain more resources with which individuals can actively change their job design and their own cognition (21). If nurses obtained rich work resources through job crafting, their work enthusiasm would be stimulated, and work happiness would be improved (35). Nurses would then be more willing to integrate into the organization and take action to increase their degree of embeddedness in their work. Job embeddedness refers to the degree to which employees are embedded in the work and social network (e.g., organizations and communities) (36). The more embedded in the organization and social network individuals are, the more tightly connected with the organization and social network they will be, and

the stronger attachment they would form to the organization. Halbesleben and Wheeler (25) indicate that individuals' strong sense of attachment to their organization, and a strong sense of belonging, would make them unwilling to damage the organization's interests and thus enact Pro-organizational behaviors. Therefore, nurses would try to avoid presenteeism due to its tendency to cause long-term organizational performance loss (26). To summarize, the resources that nurses gain from job crafting would increase their level of job embeddedness, which further makes nurses reluctant to presenteeism because of the detrimental effect on organizational performance. From this, we come up with the following hypothesis:

Hypothesis 2: *Job embeddedness has an indirect effect on the relationship between job crafting and nurses' presenteeism.*

Moderation Effects of Job Irreplaceability

Job irreplaceability is the extent to which the job content cannot be replaced by others. High job irreplaceability may result due to understaffing, lack of resources, and the task's specificity that prevents one's work from being substituted by another (37). High job irreplaceability is often associated with high job demands, which can lead to higher stress for nurses (27), and cause more health problems (2), thus increasing presenteeism. Previous studies have shown that job irreplaceability can positively affect presenteeism (38). Considering that nurses with high job embeddedness tend to have a stronger attachment to the organization (39), and are associated with more social and skill resources (28), they could address work-related problems more effectively and cope with the work pressure and potential work demand caused by high irreplaceability. Thus, reducing the presenteeism caused by job irreplaceability. In contrast, nurses with low job embeddedness have a weaker sense of attachment to the organization, often lacking sufficient resources to cope with the heavy workload, and potential work pressure, brought about by job irreplaceability (29), further intensifying job irreplaceability's impact on nurse's presenteeism. Thus, under high job irreplaceability, nurses with poor job embeddedness are more likely to experience a series of health problems and presenteeism behavior. Given that low job irreplaceability among nurses tends to be associated with more reasonable solutions to cope with absence, these individuals could more effectively cope with job challenges when relying on existing physical and mental resources, thereby less presenteeism would appear among nurses, even during poor job embeddedness. Hence, we hypothesize the following:

Hypothesis 3: *Job irreplaceability moderates the relationship between job embeddedness and nurses' presenteeism.*

MATERIALS AND METHODS

Participants

This study utilized convenience sampling. Participants were recruited from a 3A-graded hospital in the Henan Province, China. Before the investigation, all participants were informed about the research's purpose, relevant precautions for filling out the questionnaire, and the principle of confidentiality.

After obtaining their consent and cooperation, online data was collected through “www.wjx.cn” in October, November, and December 2021, respectively. Job crafting was measured in October (Time1), job embeddedness and job irreplaceability were measured in November (Time 2), and presenteeism was measured in December (Time 3). At these three time points, 900 questionnaires were distributed. After deleting invalid questionnaires at Time 1, 844 questionnaires were obtained with an effective response rate of 93.78%. After deleting invalid questionnaires at Time 2, 738 questionnaires were obtained with an effective response rate of 82%. At Time 3, 739 questionnaires were obtained after deleting invalid questionnaires, and the effective response rate is 82.11 %. Then, we screened and excluded the invalid questionnaires; the exclusion criteria were: (1) repeated questionnaires; (2) mobile phone numbers that could not be matched; (3) scores of the three times responses were the same or regular. Finally, we obtained 490 valid matching questionnaires. In this study, 316 (64.5%) participants were 31 years old and above while 174 (35.5%) were 30 years old and below; 364 (74.3%) participants had tenure of 6 years or more while 126 (25.7%) participants had tenure of 5 years or less; 456 (93.1%) participants had Bachelor and above degrees while 34 (6.9%) had Junior college and below degree. Meanwhile, the G*power was used to calculate the minimum sample size needed for the hypothesized model. The effect size f^2 was set at 0.15, the significant level (α) was set at 0.05, and the power at 0.95, and the number of predictors 5. The result showed that 138 samples were needed to validate the hypotheses of this study. Around 490 samples that enrolled in our study met the requirement of sample size for data analysis.

Measures

Job Crafting

Job Crafting was assessed by a 21-item measure by Tims et al. (40), translated by Lou (41), and widely used in China. The scale contains four subscales, namely increasing social job resources (five items; such as “I ask colleagues for advice”), increasing structural job resources (five items; such as “I try to develop myself professionally”), increasing challenging job demands (five items; such as “I try to make my work more challenging by examining the underlying relationships between aspects of my job”), and decreasing hindering job demands (six items; such as “I manage my work so that I try to minimize contact with people whose problems affect me emotionally”). 21 items were measured on a Likert 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). For this scale, Cronbach's alpha Co-efficient was 0.96.

Job Embeddedness

Job Embeddedness was assessed by part of the Job Embeddedness Scale, developed by Mitchell et al. (36), and translated by Wang (42). A total of 14 typical items were selected from the 40-item scale to evaluate nurses' job embeddedness. Three subscales were comprised of the scale, namely organizational links (three items; such as “I keep close relationships with colleagues at work”), organizational fit (five items; such as “I feel like I'm a good fit for my current job”), and organizational sacrifice (six items; such

as “Resignation will cause a lot of damage to my family and me”). 14 items were measured on a Likert 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). For this scale, Cronbach's alpha Co-efficient was 0.94.

Presenteeism

The 11-item Nurse Presenteeism Questionnaire (NPQ) developed by Shan et al. (43) was employed to measure nurses' presenteeism behavior. Items included: “Although you felt dizzy or had a headache, you still persevered in going to work.” Eleven items were measured on a Likert 4-point scale: 0 (never), 1 (once), 2 (2~5 times), and 3 (more than five times), with high scores representing more frequent instances of presenteeism. For this questionnaire, Cronbach's alpha Co-efficient was 0.95.

Job Irreplaceability

Job irreplaceability was assessed by the single item scale, as used by Aronsson and Gustafsson (37) in their research: “If you are absent from work for up to a week, what proportion of your tasks must you take up again on your return?” Responses on a Likert 4-point scale: 1 (none or only a small proportion), 2 (somewhat less than half), 3 (somewhat more than half), and 4 (virtually all). The higher scores reflect a higher irreplaceability level of the participants.

Data Analysis

SPSS, AMOS22.0, and the PROCESS (39) plug-in were used to test hypotheses. Specifically, it includes four steps. First, SPSS and AMOS were used to test for common method bias. Secondly, a descriptive analysis of participants' presenteeism scores was used. Third, the Pearson correlation analysis was evaluated to test the correlations between variables. Finally, the postulated hypotheses were tested by PROCESS and hierarchical linear regression.

Ethics Statement

The study design was approved by the Henan University, and the involving human participants were reviewed and approved by The Ethical Review Board of the Institution of Psychology and Behavior. The participants provided their written informed consent to participate in this study.

RESULTS

Tables' Preliminary Analysis

Missing Data Analysis

The 844 valid questionnaires from the first survey and the 490 matching questionnaires from Time 3 were analyzed. First, a total of 354 missing sample data were screened out by subtracting 490 matched questionnaires from the 844 total questionnaires at Time 1, the result of which was coded as the “Missing Sample” group. Then, the 490 valid questionnaires were coded as the “Effective Sample” group. We compared the differences in job crafting scores and demographic variables between the two groups, respectively. Results indicated that the score difference between missing samples and valid samples on job crafting was not significant ($P > 0.05$). There was no significant difference in tenure and education level between the two groups ($P_s > 0.05$). However, there was a significant difference in age ($P < 0.05$).

TABLE 1 | Descriptions and correlations among demographic characteristics and NPQ scores ($n = 490$).

Variables	Categories	Case	$\bar{x} \pm s$	t	P -value
Age	≤ 30	174	2.63 ± 0.86	-5.31	0.000
	≥ 31	316	3.04 ± 0.79		
Tenure	≤ 5	126	2.53 ± 0.86	-5.97	0.000
	≥ 6	364	3.02 ± 0.79		
Education level	Junior college and below	34	3.11 ± 0.70	1.61	0.109
	Bachelor and above	456	2.88 ± 0.84		

NPQ, nurse presenteeism questionnaire.

Specifically, in the Effective Sample, 316 (64.5%) participants were 31 years old and above while 174 (35.5%) were not. However, in the Missing Sample, 199 (56.2%) participants were 31 years old and above while 155 (43.8%) were not. Overall, the subsequent analysis would not be affected seriously by these missing data.

Common Method Bias

Considering that the questionnaires used in this study are all Self-reporting scales, common method bias was analyzed in diverse ways. Primarily, the Pre-control was conducted, collecting data from different time waves to reduce common method bias. Then, Harman's univariate analysis was used after collecting data through SPSS 26. These results indicated that there were seven factors with eigenvalues greater than 1 and that the first factor explains 34.43 % of the variance. Thus, no serious common method bias appeared in the study. Furthermore, the common method bias was tested through AMOS 22.0 by controlling for the effects of an unmeasured latent method. First, Model 1 was constructed through confirmatory factor analysis. Second, Model 2 was constructed including the method factor. Third, the main fit indices of Model 1 and Model 2 were compared. Results showed that the changes of each fitting index were all less than 0.04 ($\Delta RMSEA = 0.003$, $\Delta CFI = 0.015$, $\Delta IFI = 0.015$, $\Delta NFI = 0.016$, $\Delta TLI = 0.011$) and that the model was not significantly changed after adding the common method factor, which further indicated that no serious common method bias was present in the study.

The Scores of NPQ and the Differences in Demographic Characteristics

Table 1 presents the descriptive statistics of the NPQ scores. Results indicated a significant difference in NPQ scores ($t = -5.31$, $P < 0.01$) relating to nurses' age. The NPQ scores of participants aged 31 and above were significantly higher than that of those aged 30 and below, additionally, nurses with varying tenure also had significant differences in NPQ scores ($t = -5.97$, $P < 0.01$). Specifically, NPQ scores were significantly higher in nurses with 6 years or more of tenure than in nurses with 5 years or less.

TABLE 2 | Correlation of research variables ($n = 490$).

Variables	$M \pm SD$	1	2	3	4	5	6
1 Age	1.64 ± 0.48	1					
2 Tenure	1.74 ± 0.44	0.76**	1				
3 JCS	4.18 ± 0.62	-0.05	-0.03	1			
4 JEQ	3.70 ± 0.71	-0.05	-0.11*	0.54**	1		
5 NPQ	2.90 ± 0.83	0.23**	0.26**	-0.02	-0.11*	1	
6 JIQ	3.06 ± 0.98	-0.02	0.01	0.12**	0.11*	0.08	1

Age: 1 = ≤ 30 ; 2 = ≥ 31 . Tenure: 1 = ≤ 5 ; 2 = ≥ 6 . JCS, job crafting scale; JEQ, job embeddedness questionnaire; NPQ, nurse presenteeism questionnaire. JIQ, job irreplacability questionnaire. * $P < 0.05$; ** $P < 0.01$.

TABLE 3 | Results of the mediation effect of job embeddedness ($n = 490$).

Variables	Presenteeism		Job embeddedness		Presenteeism	
	β	t	β	t	β	t
Age	0.14	1.21	0.17	2.01*	0.17	1.41
Tenure	0.38	2.92**	-0.29	-3.07**	0.34	2.61**
Job crafting	-0.01	-0.18	0.61	14.23**	0.07	1.02
Job embeddedness					-0.13	-2.15*
R^2	0.07		0.30		0.08	
F	12.36**		70.89**		10.49**	

* $P < 0.05$; ** $P < 0.01$.

Variables Correlations

The results of the correlated analysis were shown in Table 2. Specifically, job crafting had a significantly positive relationship with job embeddedness ($r = 0.54$, $P < 0.01$), and job embeddedness was significantly negatively correlated with presenteeism ($r = -0.11$, $P < 0.05$). However, job crafting was not significantly related to presenteeism ($r = -0.02$, $P > 0.05$), which indicated that Hypothesis 1 was not supported.

Considering that the statistical power would decline by an excess of control variables (44), age and tenure have a significant influence on nurses' presenteeism in this study, while education level has no significant effect on it; thus, nurses' age and tenure were included as control variables in the follow-up analysis and education level was not included.

Mediation Effects of Job Embeddedness

Model 4 in the pluggable unit of PROCESS in SPSS compiled by Hayes (45) was used to test job embeddedness' mediating effect on the relationship between job crafting and presenteeism while controlling for age and tenure. The results were presented in Table 3.

Results showed that the direct effect of job crafting on presenteeism was not significant ($\beta = -0.01$, $P > 0.05$). Further, the mediating effect of job embeddedness was analyzed, which indicated that the 95 % bias-corrected confidence interval for the indirect effect of job embeddedness excluded zero [$CI = (-0.161, -0.003)$] and the mediator effect was -0.081 . After controlling

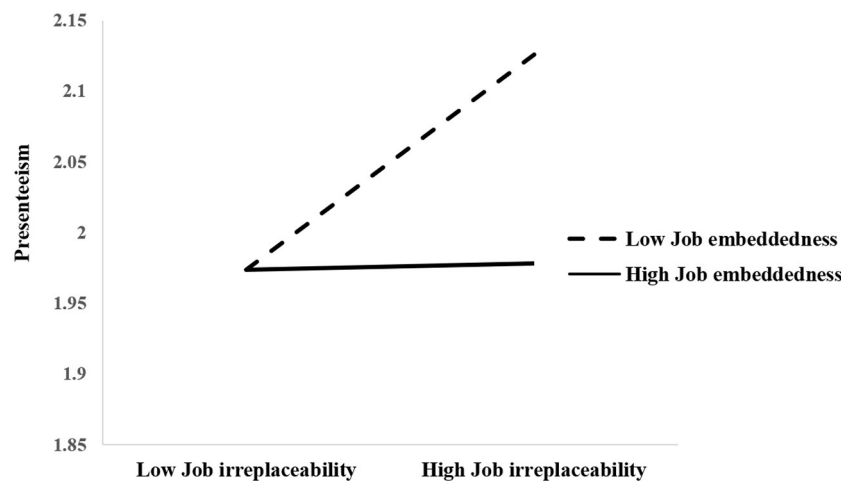


FIGURE 2 | Moderation effect of job irreplaceability between job embeddedness and presenteeism.

the mediation variable of job embeddedness, job crafting's direct effect on presenteeism was not significant [95 % CI = (−0.066, 0.208), $t = 1.018$, $P > 0.05$]. Therefore, job embeddedness played a complete mediation role between job crafting and presenteeism, and Hypothesis 2 was supported.

Moderation Effects of Job Irreplaceability

Model 1 in the pluggable unit of PROCESS was used to test the moderating effect of job irreplaceability on job embeddedness and presenteeism while controlling for age and tenure. The results showed that the main effects of job embeddedness ($\beta = -0.07$, $P < 0.05$) and job irreplaceability ($\beta = 0.08$, $P < 0.05$) on presenteeism were significant, and that the interaction of the two also significantly impacts presenteeism ($\beta = -0.07$, $P < 0.05$). The results provided evidence that job irreplaceability has a significant moderation effect on the relationship between job embeddedness and presenteeism. Hypothesis 3 was thus confirmed.

Then, a simple slope test was used to reveal job irreplaceability's moderating trend on the relationship between job embeddedness and presenteeism (see Figure 2). As indicated in Figure 2, in the condition of low job irreplaceability, job embeddedness had no significant impact on presenteeism ($\beta = -0.001$, $P > 0.05$). While in the high job irreplaceability group, the impact of job embeddedness on presenteeism was significant ($\beta = -0.15$, $P < 0.01$). With increasing job irreplaceability, nurses with lower job embeddedness suffered more presenteeism than the nurses with higher job embeddedness.

Furthermore, the moderated mediation model test was conducted through Model 14 in the pluggable unit of PROCESS in SPSS. The results are presented in Table 4 and Figure 3. The moderated mediation effect is significant with an index of −0.63, and a 95 % bias-corrected confidence interval of [−0.122, −0.001]. Specifically, when the level of job irreplaceability was low (−1SD), the mediating effect of the mediator was not significant and the effect was 0.016 [95 %

TABLE 4 | Test of the moderated mediation model ($n = 490$).

Variable	Job embeddedness		Presenteeism	
	β	t	β	t
Age	0.17	2.01*	0.17	1.41
Tenure	−0.29	−3.07**	0.33	2.56*
Job crafting	0.61	14.23**	0.05	0.69
Job embeddedness			−0.13	−2.08*
Job irreplaceability			0.08	2.05*
Job embeddedness × Job irreplaceability			−0.10	−2.08*
R^2	0.30		0.10	
F	70.89**		8.46**	

* $P < 0.05$; ** $P < 0.01$.

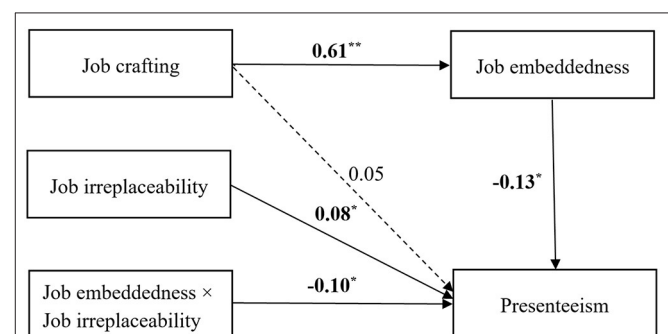


FIGURE 3 | Results of the moderated mediation model.

CI = (−0.123, 0.084)]. When the level of job irreplaceability was high (+1SD), the mediating effect of job embeddedness was significant and the effect was −0.137 [95 % CI = (−0.228, −0.051)].

DISCUSSION

Discussion of Results

Under the global epidemic of COVID-19, as the vanguard of epidemic prevention and control, healthcare workers are fighting against the high risk of disease transmission and facing high health threats; thus, their health issues are worth more attention than ever before. Previous research has shown that the COVID-19 pandemic had varied degrees of detrimental impact on the mental health of healthcare workers (46). For example, healthcare workers experienced higher levels of depression, anxiety (6), and emotional exhaustion than usual (47). Meanwhile, the presenteeism of healthcare workers also increased during this period (48). Given that nurses' presenteeism tends to lead to more work errors (49) and increased patient health and safety risks (50), paying attention to nurses' working health behavior is vital for promoting nurses' level of healthcare service. This study investigated the relationship mechanism of job crafting and nurses' presenteeism through the perspective of internal motivation, which enriches the research regarding presenteeism's occurrence mechanism. Moreover, the present study explored job embeddedness' mediating role and job irreplaceability's moderating role in the relationship between job embeddedness and presenteeism, which blends the factors of personal motivation and work characteristics in an integrated model. The results may thus trigger more contemplations regarding the prevention and management of nurses' presenteeism.

First, the results indicated an association between older age and greater levels of presenteeism, which is consistent with previous studies (23). This may be due to younger nurses' tendency to face the status of volatile income security and lower organizational loyalty, which makes them consider their work as less important than their health, and therefore, be inclined to take sick leave when they are in poor health (51). Meanwhile, the results also showed an association for nurses between longer tenure and greater presenteeism, which is consistent with previous studies (4). This may be due to nurses with longer tenure regarding their presenteeism as a role model for their colleagues with shorter tenure (52), however, nurses with longer tenure also closely interact with patients in daily work. They may thus be afraid that their absence would affect the patient's recovery and are thus inclined to presenteeism under poor health instead of absence (29).

Second, the results revealed that job crafting can reduce presenteeism by increasing job embeddedness. Leana et al. (31) highlighted that in the process of job crafting, nurses would proactively search for a range of support resources from their manager and organization. These resources included organizational training, benefit programs, and leadership or colleague information sharing, which aids the improvement of nurses' sense of work meaning and job control, enhancing the degree of job fit with abilities, working styles, and hobbies (53), thus to increase the level of job embeddedness. Nurses with a high level of job embeddedness tend to attach great importance to organizational interests, keep high organizational loyalty (39), and aim to maximize benefits for the organization. Hence, they might be keenly aware of the dark side of presenteeism,

a negative work state that would lead to depletion of work capacity and loss of organizational productivity (54), and thus, avoid its occurrence. In general, individuals' job crafting would increase their job embeddedness, which would result in having higher organizational loyalty and tighter organizational ties, and thus, further influence them to avoid conducting presenteeism to maintain organizational interests. In previous studies on job crafting, scholars mainly examined the relationship between job crafting and positive outcome variables. Although a scholar mentioned that job crafting may be related to presenteeism (negative variable) and presenteeism should be explained from the perspective of job crafting (24), there is still a lack of relevant research. This study provides an empirical basis for this by exploring the relationship between job crafting and presenteeism, which can expand the research scope of outcome variables related to job crafting. Meanwhile, this study expanded the research scope of the antecedent variable of presenteeism, which shifts the perspective from negative variables possibly related to presenteeism to the positive variable (job crafting) that could play a role in presenteeism.

Third, the findings confirmed that job irreplaceability played a moderating role in the relationship between job embeddedness and presenteeism. The high job irreplaceability indicates a lack of work resources, requiring more complex and special skills, which often require nurses to devote more time and energy to complete the work and thus deplete more physical and psychological resources. Nurses with high job embeddedness tend to have a stronger sense of attachment to the organization (39). In this situation, they are associated with more social and skill resources (28), which can help them effectively cope with the potential job demands and job stress caused by high irreplaceability, thus reducing the risk of presenteeism. Therefore, high job irreplaceability may not be a key factor affecting nurses with high job embeddedness's decision to choose presenteeism. On the contrary, people with low job embeddedness lack effective resources to deal with the potential stress and demands caused by high job irreplaceability, so they need to consume additional resources. When such physical and mental resources are excessively consumed, and not replenished in time, exhaustion and burnout will occur, which in turn increases presenteeism (29). Therefore, high job irreplaceability increases the incidence of presenteeism in people with low job embeddedness. For low job irreplaceability, work tasks and responsibilities are simpler, work pressure is lower, and nurses can effectively cope with it through existing resources. Therefore, the impact of low job irreplaceability on nurses with different levels of embeddedness is not significant.

Theoretical Implications

Based on the COR and JDR theories, this study explored the mechanism of job crafting on nurses' presenteeism, providing the empirical basis for COR and JDR theories. Job crafting and presenteeism belong to two independent fields in previous studies. Although one scholar suggested that presenteeism should be explored from the perspective of job crafting (24), there is still a lack of relevant empirical research. This study establishes a bridge between job crafting and presenteeism as it is the first

to examine the relationship between job crafting and nurses' presenteeism, as well as introduce job embeddedness and job irreplaceability. It not only draws the research on the antecedent variables of presenteeism into a new perspective but also enriches the research scope of the consequences variables of job crafting.

First, numerous studies focused on the negative influence of presenteeism on individual physical health, mental health, and organizational productivity (55). Research on its antecedent variables mostly focused on external objective targets such as colleagues, leaders, and organizations (20), and less attention was paid to whether factors related to individual internal motivation can affect presenteeism. Based on the perspective of individual internal motivation, this study explored the impact of job crafting on nurses' presenteeism, which is conducive to enriching and improving the research on presenteeism.

Second, job crafting, as a top-down behavior, is regarded as a positive behavior of employees' spontaneous initiative, and the related research has always focused on its positive outcomes, such as employee job satisfaction (21), job happiness (56, 57), and organizational performance (58). In this study, it is indicated that unhealthy working behavior (presenteeism) could be indirectly decreased through job crafting, which is helpful in enriching research on job crafting's inhibiting effect on negative outcomes and broadening the job crafting research perspective.

Practical Implications

There are two valuable practical implications in the present study. First, we explored the effect of job crafting on nurses' presenteeism and examined the mediating effect of job embeddedness and the moderating effect of job irreplaceability between them. This study highlights the importance of caring about healthcare practitioners, which might increase the attention of the healthcare industry to presenteeism, thus arousing concern for nurses' physical and mental health. The findings help formulate corresponding management systems effectively and reasonably, which could provide nurses with a good support environment and adequate job replacement resources, from the perspective of job crafting, for alleviating the occurrence of presenteeism.

Second, in the field of organizational management, most of the research on job crafting involved its positive outcome factors. By examining the relationship between job crafting and the negative variables-nurses' presenteeism, the study reveals that job crafting can reduce the occurrence of nurses' presenteeism through increasing job embeddedness. It is, thus, beneficial for organizational management departments, and individuals, to focus on job crafting's preventive effect on presenteeism, which could promote the full positive role of job crafting behaviors.

Limitations and Future Research

Our study has several notable limitations. Our data was collected during a period when the epidemic situation in China was generally stable, indicating there were no confirmed COVID-19 positive cases in our sample area, and the work arrangement of the nursing professionals was close to the normal before the epidemic. However, the international epidemic is not stable, and domestic coastal cities, such as Shanghai

and Guangzhou, have imported cases with the positive nucleic acid test for COVID-19. Therefore, the item description of presenteeism may trigger associations about COVID-19, leading to a certain degree of bias in the Self-reports of presenteeism behaviors among nurses. Furthermore, Self-reported scales were the main data measurement tools used in this study. When answering questions, social expectations and self-approval might thus influence the objectivity of the final data. Multi-angle measurement methods should be adopted in future research, such as adding situational imagination and experimental operations, or combining the evaluation of leaders and colleagues, to improve the objectivity and scientific nature of the research.

Due to the particularity of the nursing group, differences exist from other groups regarding occupational stability, gender ratios, and work pressure. Therefore, future research can be conducted on groups of different occupations, which will further broaden the related research on presenteeism behavior. Additionally, this study focuses on a large 3A-graded hospital in a prefecture-level city in the Henan Province. The sample size and number are, thus, representative, however, there are differences in the rules, regulations, and economic income of hospital nurses in different regions. Future research can thus collect data from nurses in different regions, such as general hospitals, or hospitals in other provinces and rural areas, further comparing and refining the research on nurses' presenteeism behavior.

CONCLUSION

Our study investigated the impact of job crafting on presenteeism from the internal motivation perspective and examined the mediation effect of job embeddedness and the moderation effect of job irreplaceability. Results showed that although job crafting, a traditionally positive variable, and presenteeism, a traditionally negative variable, were not significantly correlated, job crafting could indirectly reduce the occurrence of presenteeism by increasing job embeddedness. Additionally, job irreplaceability played a moderating role in the relationship between job embeddedness and presenteeism. The predictive effect of job embeddedness on presenteeism was stronger with the improvement of job irreplaceability. The results, thus, enrich the research on the antecedent variables of presenteeism, fill the gap in the research on the proactive antecedence related to presenteeism, and may further expand research in occupational health psychology, organizational management psychology, and other fields. Therefore, hospital management should pay attention to providing nurses with appropriate and rich resource support, as well as adding specialized staffing shifts and replacement positions. Nurses should also engage in more job crafting behaviors to exploit more resource support and strengthen organizational ties to reduce presenteeism.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Research Ethics Committee of the Institute of Psychology and Behavior, Henan University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

Under the direction of WW, YL, TL, and GS generated the idea and designed the study, they were the principal investigators for the study and was the primary writer of the manuscript. YZ and JL supported the data input, data analysis, and data collection.

REFERENCES

- Aronsson G, Gustafsson K, Dallner M. Sick but yet at work. An empirical study of sickness presenteeism. *J Epidemiol Community Health*. (2000) 54:502–9. doi: 10.1136/jech.54.7.502
- Mitchell KJ, Vayalunkal JV. Sickness presenteeism: the prevalence of coming to work while ill among pediatric resident physicians in Canada. *Paediatr Child Health*. (2017) 22:84–8. doi: 10.1093/pch/pxx026
- Gustafsson K, Marklund S. Consequences of sickness presence and sickness absence on health and work ability: a Swedish prospective cohort study. *Int J Occup Med Environ Health*. (2011) 24:153–65. doi: 10.2478/s13382-011-0013-3
- Shan G, Wang S, Wang W, Guo S, Li Y. Presenteeism in nurses: prevalence, consequences, and causes from the perspectives of nurses and chief nurses. *Front Psychiatry*. (2020) 11:584040. doi: 10.3389/fpsy.2020.584040
- Ehrlich H, Mckenney M, Elkbuli A. Protecting our healthcare workers during the COVID-19 pandemic. *Am J Emerg Med*. (2020) 38:1527–8. doi: 10.1016/j.ajem.2020.04.024
- Leng M, Xiu H, Yu P, Feng J, Wei Y, Cui Y, et al. Current state and influencing factors of nurse resilience and perceived job-related stressors. *J Contin Educ Nurs*. (2020) 51:132–7. doi: 10.3928/00220124-20200216-08
- Lorente L, Vera M, Peiró T. Nurses stressors and psychological distress during the COVID pandemic: the mediating role of coping and resilience. *J Adv Nurs*. (2020) 77:1335–44. doi: 10.1111/jan.14695
- Lupuoru I, Ciobanu D, Ursaru M, Blan GG, Grigorovici A. Difficulties in treating a patient with multiple cancers in the COVID-19 pandemic. *Chirurgia*. (2020) 5:115. doi: 10.21614/chirurgia.115.5.670
- Nikolayevskyy V, Holicka Y, Soelingen DV, Werf M, Cirillo D. Impact of covid-19 pandemic on tuberculosis laboratory services in Europe. *Eur Respir J*. (2020) 57:2003890. doi: 10.1183/13993003.03890-2020
- Meijman TF, Mulder G. Psychological aspects of workload. In: Drenth PJD, Thierry H, de Wolff CJ, editors. *Handbook of Work and Organizational: Work Psychology*. London: Psychology Press/Erlbaum (UK) Taylor & Francis (1998). p. 5–33.
- Taloyan M, Aronsson G, Leineweber C, Magnusson Hanson LM, Alexanderson K, Westerlund H. Sickness presenteeism predicts suboptimal self-rated health and sickness absence: a nationally representative study of the Swedish working population. *PLoS ONE*. (2012) 7:e44721. doi: 10.1371/journal.pone.0044721
- Fiorini LA, Houdmont J, Griffiths A. Nurses' perceived work performance and health during presenteeism: cross-sectional associations with personal and organizational factors. *J Nurs Manag*. (2020) 13065. doi: 10.1111/jonm.13065. [Epub ahead of print].
- Skagen K, Collins AM. The consequences of sickness presenteeism on health and wellbeing over time: a systematic review. *Soc Sci Med*. (2016) 161:169–77. doi: 10.1016/j.socscimed.2016.06.005
- Yildirim MH, Saygin M, Uguz S. Effects of presenteeism syndrome on employees' burnout levels. *Int J Soc Sci*. (2014) 6:1–10.
- Rivkin W, Diestel S, Gerpott FH, Unger D. Should I stay or should I go? The role of daily presenteeism as an adaptive response to perform at work despite somatic complaints for employee effectiveness. *J Occup Health Psychol*. (2022). doi: 10.1037/ocp0000322. [Epub ahead of print].
- Demerouti E, Le Blanc PM, Bakker AB, Schaufeli WB, Hox J. Present but sick: a three-wave study on job demands, presenteeism and burnout. *Career Dev Int*. (2009) 14:50–68. doi: 10.1108/13620430910933574
- Howard JT, Howard KJ. The effect of perceived stress on absenteeism and presenteeism in public school teachers. *J Workplace Behav Health*. (2020) 35:100–16. doi: 10.1080/15555240.2020.1724794
- Reuter M, Wahrendorf M, Di Tecco C, Probst TM, Ruhle S, Ghezzi V, et al. Do temporary workers more often decide to work while sick? Evidence for the link between employment contract and presenteeism in Europe. *Int J Environ Res Public Health*. (2019) 16:1868. doi: 10.3390/ijerph16101868
- Dietz C, Zacher H, Scheel T, Otto K, Rigotti T. Leaders as role models: effects of leader presenteeism on employee presenteeism and sick leave. *Work Stress*. (2020) 34:300–22. doi: 10.1080/02678373.2020.1728420
- Liu B, Lu Q, Zhao Y, Zhan J. Can the psychosocial safety climate reduce ill-health presenteeism? Evidence from Chinese healthcare staff under a dual information processing path lens. *Int J Environ Res Public Health*. (2020) 17:1–17. doi: 10.3390/ijerph17082969
- Tims M, Bakker AB. Job crafting: toward a new model of individual job redesign. *SA J Ind Psychol*. (2010) 36:1–9. doi: 10.4102/sajip.v36i2.841
- Bakker AB, Demerouti E. The job demands-resources model: state of the art. *J Manag Psychol*. (2007) 22:309–28. doi: 10.1108/02683940710733115
- Yi JS, Kim H. Factors related to presenteeism among South Korean workers exposed to workplace psychological adverse social behavior. *Int J Environ Res Public Health*. (2020) 17:3472. doi: 10.3390/ijerph17103472
- Gjæver F, Løvseth Lise T. Exploring presenteeism among hospital physicians through the perspective of job crafting. *Qual Res Organ Manag Int J*. (2019) 15:296–314. doi: 10.1108/QROM-11-2018-1699
- Halbesleben JRB, Wheeler AR. The relative roles of engagement and embeddedness in predicting job performance and intention to leave. *Work Stress*. (2008) 22:242–56. doi: 10.1080/02678370802383962
- Letvak SA, Ruhm CJ, Gupta SN. Nurses' presenteeism and its effects on Self-reported quality of care and costs. *Am J Nurs*. (2012) 112:30–8; quiz 48, 39. doi: 10.1097/01.NAJ.0000411176.15696.f9
- Caverley N, Cunningham JB, Macgregor JN. Sickness presenteeism, sickness absenteeism, and health following restructuring in a public service organization. *J Manag Stud*. (2007) 44:304–19. doi: 10.1111/j.1467-6486.2007.00690.x
- Tabak F, Hendy NT. Work engagement: trust as a mediator of the impact of organizational job embeddedness and perceived organizational support. *Organ Manag J*. (2016) 13:21–31. doi: 10.1080/15416518.2015.1116968
- McKevitt C, Morgan M, Dundas R, Holland WW. Sickness absence and "working through" illness: a comparison of two

- professional groups. *J Public Health Med.* (1997) 19:295–300. doi: 10.1093/oxfordjournals.pubmed.a024633
30. Lu LL, Cooper C, Yen Lin H. A cross-cultural examination of presenteeism and supervisory support Career. *Dev Int.* (2013) 18:440–56. doi: 10.1108/CDI-03-2013-0031
 31. Leana C, Appelbaum E, Shevchuk I. Work process and quality of care in early childhood education: the role of job crafting. *Acad Manag J.* (2009) 52:1169–92. doi: 10.5465/amj.2009.47084651
 32. Halbesleben JR, Harvey J, Bolino MC. Too engaged? A conservation of resources view of the relationship between work engagement and work interference with family. *J Appl Psychol.* (2009) 94:1452–65. doi: 10.1037/a0017595
 33. Hobfoll SE. Conservation of resources: a new attempt at conceptualizing stress. *Am Psychol.* (1989) 44:513–24. doi: 10.1037/0003-066X.44.3.513
 34. Zhang L, Fan C, Deng Y, Lam CE, Hu E, Wang L. Exploring the interpersonal determinants of job embeddedness and voluntary turnover: a conservation of resources perspective. *Hum Resour Manag J.* (2019) 29:413–32. doi: 10.1111/1748-8583.12235
 35. Kim M, Beehr TA. Can empowering leaders affect subordinates' wellbeing because they encourage subordinates' job crafting behaviors? *J Leadership Organ Stud.* (2018) 25:184–96. doi: 10.1177/1548051817727702
 36. Mitchell TR, Holtom BC, Lee TW, Sablinski CJ, Erez M. Why people stay: using job embeddedness to predict voluntary turnover. *Acad Manag J.* (2001) 44:1102–21. doi: 10.5465/3069391
 37. Aronsson G, Gustafsson K. Sickness presenteeism: prevalence, attendance-pressure factors, and an outline of a model for research. *J Occup Environ Med.* (2005) 47:958–66. doi: 10.1097/01.jom.0000177219.75677.17
 38. Hu WJ. *The Influence of Replaceability on Presenteeism—The Adjustment of Position and Gender* (Master thesis). Institute of Psychology, Chinese Academy of Sciences (2015).
 39. Kiazad K, Holtom BC, Hom PW, Newman A. Job embeddedness: a multifoci theoretical extension. *J Appl Psychol.* (2015) 100:641–59. doi: 10.1037/a0038919
 40. Tims M, Bakker AB, Derks D. Development and validation of the job crafting scale. *J Vocat Behav.* (2012) 80:173–86. doi: 10.1016/j.jvb.2011.05.009
 41. Lou TY. *A Study on the Impact of Job Insecurity on Job Crafting: A Moderated Mediation Model* (Master thesis). Jinan University (2020).
 42. Wang Y. *Study on the Influence of Difference Sequence and Job Embedding on the Employee Turnover Intention* (Master thesis). Shandong Agricultural University (2020).
 43. Shan G, Wang S, Feng K, Wang W, Guo S, Li Y. Development and validity of the nurse presenteeism questionnaire. *Front Psychol.* (2021) 12:679801. doi: 10.3389/fpsyg.2021.679801
 44. Becker TE. Potential problems in the statistical control of variables in organizational research: a qualitative analysis with recommendations. *Organ Res Methods.* (2005) 8:274–89. doi: 10.1177/1094428105278021
 45. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: a regression-based approach. *J Educ Meas.* (2013) 51:335–7. doi: 10.1111/jedm.12050
 46. Oliveira MMD, Treichel CADS, Bakolis I, Alves PF, Coimbra VCC, Cavada GP, et al. Mental health of nursing professionals during the COVID-19 pandemic: a cross-sectional study. *Rev Saude Publica.* (2022) 56:8. doi: 10.11606/s1518-8787.2022056004122
 47. Wang H, Zhou X, Jia X, Song C, Luo X, Zhang H, et al. Emotional exhaustion in front-line healthcare workers during the covid-19 pandemic in wuhan, China: the effects of time pressure, social sharing and cognitive appraisal. *BMC Public Health.* (2021) 21:829. doi: 10.1186/s12889-021-10891-w
 48. White-Means SI, Warren CL, Osmani AR. The organizational impact of presenteeism among key healthcare workers due to the COVID-19 pandemic. *Rev Black Polit Econ.* (2022) 49:20–40. doi: 10.1177/00346446211065175
 49. Niven K, Ciborowska N. The hidden dangers of attending work while unwell: a survey study of presenteeism among pharmacists. *Int J Stress Manag.* (2015) 22:207–21. doi: 10.1037/a0039131
 50. Freeling M, Rainbow JG, Chamberlain D. Painting a picture of nurse presenteeism: a multi-country integrative review. *Int J Nurs Stud.* (2020) 109:103659. doi: 10.1016/j.ijnurstu.2020.103659
 51. Gustafsson K, Marklund S, Leineweber C, Bergström G, Aboagye E, Helgesson M. Presenteeism, psychosocial working conditions and work ability among care workers—A cross-sectional Swedish population-based study. *Int J Environ Res Public Health.* (2020) 17:2419. doi: 10.3390/ijerph17072419
 52. Kinman G, Clements AJ, Hart J. When are you coming back? Presenteeism in UK prison officers. *Prison J.* (2019) 99:363–83. doi: 10.1177/0032885519838019
 53. Chen CY, Yen CH, Tsai FC. Job crafting and job engagement: the mediating role of person-job fit. *Int J Hosp Manag.* (2014) 37:21–8. doi: 10.1016/j.ijhm.2013.10.006
 54. Jiang H, Jia H, Zhang J, Li Y, Song F, Yu X. Nurses' occupational stress and presenteeism: the mediating role of public service motivation and the moderating role of health. *Int J Environ Res Public Health.* (2021) 18:3523. doi: 10.3390/ijerph18073523
 55. Côté K, Lauzier M, Stinglhamer F. The relationship between presenteeism and job satisfaction: a mediated moderation model using work engagement and perceived organizational support. *Eur Manag J.* (2021) 39:270–8. doi: 10.1016/j.emj.2020.09.001
 56. Tims M, Bakker AB, Derks D. The impact of job crafting on job demands, job resources, and wellbeing. *J Occup Health Psychol.* (2013) 18:230–40. doi: 10.1037/a0032141
 57. Tims M, Bakker AB, Derks D. Examining job crafting from an interpersonal perspective: is employee job crafting related to the wellbeing of colleagues? *Appl Psychol.* (2015) 64:727–53. doi: 10.1111/apps.12043
 58. Tims M, Bakker AB, Derks D, van Rhenen WV. Job crafting at the team and individual level. *Group Organ Manag.* (2013) 38:427–54. doi: 10.1177/1059601113492421

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Influencing Factors of Mental Health Status of Dentists Under COVID-19 Epidemic

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Objective: To investigate dentists' psychological status and influencing factors in Shaanxi Province during the COVID-19 epidemic and assess their perceived wellness.

Methods: The study was conducted among dentists from Shaanxi Province in China. The basic information was collected through the network questionnaire star platform. Depression, Anxiety, and Stress Scales (DASS-42) and Perceived Wellness Survey (PWS) were used to assess subjects' psychological status and perceived wellness. Univariate linear regression analysis and multivariate analysis were performed on the influencing factors of depression, anxiety, and stress, and *t*-test and analysis of variance were used to analyze the perceived wellness results.

Results: The results demonstrated that 33.2% of the surveyed dentists were in a state of depression, 37.1% were anxious, and 34.4% reported stress among 256 subjects. Linear Regression analysis results showed that: "years of working," "the impact of COVID-19 on their life, work, and sleep," "worrying about occupational exposure/virus infection," "lacking the awareness of prevention and control measures," "overtime work during the epidemic," "worrying about participating in the supporting work," and "continuous exhaustion from work" were significant contributors to depression, anxiety, and stress status. In addition, the results of PWS found that each dimension of PWS was correlated with depression, anxiety, and stress state, which indicates the individual's physical and mental health state was associated with multiple factors.

Conclusion: COVID-19 has significantly impacted dentists' mental health in Shaanxi Province. With these findings, we aim to educate and promote targeted interventions that can be utilized to improve dentists' mental health by analyzing the influencing factors.

Keywords: COVID-19, depression, anxiety, stress, perceived wellness survey, dentists

OPEN ACCESS

Edited by:

Lawrence T. Lam,
University of Technology Sydney,
Australia

Reviewed by:

Susan Ka Yee Chow,
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China

Wai Fu,
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Specialty section:

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Psychiatry

Received: 01 May 2022

Accepted: 13 June 2022

Published: 11 July 2022

Citation:

Li J, Guo J, Zhao J, Guo Y and
Chen C (2022) Influencing Factors
of Mental Health Status of Dentists
Under COVID-19 Epidemic.
Front. Psychiatry 13:933514.
doi: 10.3389/fpsy.2022.933514

INTRODUCTION

COVID-19 has rapidly and globally spread since the first case was reported in Wuhan, China, in December 2019. The World Health Organization announced on 30 January 2020 that the COVID-19 outbreak was listed as an internationally concerned public health emergency (1). By the time the author wrote this article, there were 500,186,525 confirmed COVID-19 cases and 6,190,349 deaths reported to WHO, and a total of 11,294,502,059 vaccine doses had been administered (2).

The global outbreak of COVID-19, individual fear of infectious disease, quarantine policies for infected and close contact people, the global economic recession, and unemployment have negatively affected many people's mental health (3). Many reports show that the stress caused by COVID-19 has had a range of adverse effects on their health, such as insomnia, anxiety, depression, and the exacerbation of chronic diseases (4). Furthermore, with the increasing number of cases, medical workers suffered from great psychological and work pressure and faced a high risk of infection during the epidemic.

The novel COVID-19 is highly contagious. Respiratory droplets and close contact are the main routes of transmission. The concept of COVID-19 "aerosol" transmission was first introduced in China's "Diagnosis and Treatment Protocol (Trial Fifth Edition)." "Aerosol transmission in a relatively confined environment" is now confirmed as one of the routes of transmission of COVID-19 (5). Oral treatment and surgery usually produce a large number of aerosols and droplets. Oral environments include face-to-face contact with patients, long-term exposure to saliva, blood, other body fluids, airborne microorganisms, and the use of sharp instruments that increase the risk of infection (6). The COVID-19 virus can survive in aerosols for more than 3 h, and its attachment to some surfaces can be detected even after 72 h (7). Patients must have masks removed for oral diagnosis and treatment, leading to the inability to maintain a safe interpersonal distance between dentists and their patients. In addition, the dentist is also exposed to the patient's saliva, blood, and other close contact exposures, which increases the risk of infection (8). Some scholars have found that oral epithelial cells contain a large number of Angiotensin-Converting Enzyme 2 (ACE2), which has been proved to be an important receptor for the COVID-19 virus (9), and the expression of ACE2 in small salivary glands is significantly greater than that in the lung (10). Based on these characteristics, dentists face a high risk of infection in their work, affecting their mental state and concerns of exposure.

During the outbreak stage, the stomatology departments of some general hospitals and private dental clinics in Shaanxi Province stopped receiving treatment. Instead, the stomatological hospitals provided treatment with the principle of "one patient, one room, one doctor, one care and one disinfection." Predictably, dentists facing this high risk of exposure and firm quarantine policies can harm their physical and mental health.

Scholars who surveyed dentists from 30 different countries found that more than 2/3 (78%) of dentists were anxious and worried about the impact of COVID-19 (11). At present, there are many studies on the mental health status of frontline

medical staff during the epidemic period at home and abroad. However, according to our literature review, there are few studies on the mental health status of dentists during the COVID-19 epidemic period in China. This article used different scales to analyze the mental health status of dentists in Shaanxi Province. We hope that through our research, we can find out the possible influencing factors which affect the mental health of dentists during the COVID-19 epidemic, and provide targeted psychological counseling for dentists.

DATA AND METHODS

Participants

This study was conducted in Shaanxi Province in China between 17 January 2022 and 23 January 2022. All questionnaires were distributed through an online questionnaire survey platform. All participants were informed of the principles for filling out the form and signed an online informed consent form before answering. The inclusion criteria were designated as (1) on duty during the outbreak; (2) can skillfully use smartphones to fill out questionnaires. Exclusion criteria were designated as (1) had psychological problems before the study (such as depression, anxiety, insomnia, etc.); (2) non-dental medical staff; (3) cannot use smartphones. This study has been approved by the Medical Ethics Committee of Xi'an Jiaotong University, Hospital of Stomatology (Approval No.xjkql [2022]NO.001). The researchers kept all questionnaire data confidential.

Survey Tools

The tool used is called questionnaire star,¹ which were anonymous online questionnaires. To ensure the validity of the data, each IP can only be answered once.

Questionnaires

General Demographic Information

We obtained general demographic information (including gender, age, marital and fertility status, education level, years of working, nature of the hospital, etc.) about the respondents through the self-designed questionnaire.

Depression, Anxiety, and Stress Scales

The depression, anxiety, and stress scales (DASS-42) is a self-report tool with 42 items designed to identify the distinction symptoms between anxiety and depression and reveal their common feature called stress (12). The questionnaire has been translated into multiple languages and has proven cross-cultural validity (13). The DASS-42 scale classifies depression, anxiety, and stress into five grades: normal, mild, moderate, severe, and very severe (scoring criteria: depression — normal: 0–9; mild: 10–13; moderate: 14–20; severe: 21–27; very severe: 28 + . Anxiety — normal: 0–7; mild: 8–9; moderate: 10–14; severe: 15–19; very severe: 20 + . Stress — normal: 0–14; mild: 15–18; moderate: 19–25; severe: 26–33; very severe: 34 +). A higher score indicates a higher depression, anxiety, and stress level. The details are shown

¹<http://www.wjx.com>

in **Table 1**. The Cronbach's alpha reliability factor for the whole scale was 0.968 and reliability factors of 0.930, 0.894, and 0.923 for depression, anxiety, and stress (Cronbach's alpha obtained from this sample). It is worth noting that the results do not provide any clinical diagnostic significance. If they were concerned about their psychological condition, they were instructed to seek a professional doctor in time.

Perceived Wellness Survey

Perceived wellness survey (PWS) is a valid scale for researching and evaluating interventions in the field of perceived health, with good reliability and validity (14, 15). The PWS contains 36 items which included six dimensions: physical (1, 7, 13, 19, 25, 31), emotional (2, 8, 14, 20, 26, 32), social (3, 9, 15, 21, 27, 33), psychological (4, 10, 16, 22, 28, 34), spiritual (5, 11, 17, 23, 29, 35), and intellectual (6, 12, 18, 24, 30, 36) which were selected based on the strength of theoretical support and the quality of empirical evidence supporting each. The PWS assesses the perceived health of individuals and their physical, mental, and spiritual states and the social health they exhibit through relationships with others. Therefore, it is used as a comprehensive questionnaire to investigate an individual's overall health (16, 17). For the positive questions, scores of 6, 5, 4, 3, 2, and 1 represent "completely agree," "agree," "somewhat agree," "somewhat disagree," "disagree," and "completely disagree." The negative questions were scored contrariwise. A higher score indicates a better perception of wellness. The Cronbach's alpha reliability factor for the whole scale was 0.911 and 0.703, 0.675, 0.649, 0.643, 0.665, and 0.743 for physical, emotional, social, psychological, spiritual, and intellectual, respectively (Cronbach's alpha obtained from this sample).

Data Analysis

SPSS 26.0 software was used for statistical analysis. Counting data is expressed in frequency, percentage, mean, and standard deviation.

Univariate linear regression was used for univariate analysis to explore the factors that might impact subjects' depression, anxiety, and stress status during the COVID-19 pandemic. The statistically significant variables in the univariate analysis were taken as independent variables, and the scores of the three subscales in DASS-42 were taken as the dummy variables. The stepwise regression analysis was used for multi-factor analysis. In this study, the severe and very severe groups were combined into one group, $p < 0.05$ indicated a statistical difference.

The t -test and chi-square test were used to compare the PWS scores of subjects with different demographic characteristics.

TABLE 1 | Depression, anxiety, and stress scales (DASS-42) scoring criteria.

	Depression	Anxiety	Stress
Normal	0–9	0–7	0–14
Mild	10–13	8–9	15–18
Moderate	14–20	10–14	19–25
Severe	21–27	15–19	26–33
Very severe	27+	20+	34+

The relationship between six dimensions scores of PWS and depression, anxiety, and stress states were analyzed by bivariate correlation analysis, $p < 0.05$ indicated statistical difference.

RESULTS

General Demographic Data

A total of 256 questionnaires were collected in this study, of which 256 were valid, with an effective rate of 100%. Basic information on subjects, such as gender, age, marital and fertility status, whether or not they live alone, general health, education level, years of working, and professional title, were collected (**Table 2**).

Characteristics of Depression, Anxiety, and Stress Status of Dentists During the COVID-19 Epidemic

Among the 256 questionnaires collected, 85 cases (33.2%) showed depression, 95 cases (37.1%) showed anxiety, and 88 cases

TABLE 2 | General demographic characteristics of participants.

Characteristic	n	%
Gender		
Male	77	30.1
Female	179	69.9
Age		
21–30	108	42.2
31–40	123	48.0
41–50	17	6.6
≥51	8	3.1
Live alone		
Yes	80	31.3
No	176	68.7
Marital status		
Married	167	65.2
Unmarried	89	34.8
Fertility status		
None	110	43.0
1 Child	110	43.0
≥2 Children	36	14.0
Past medical history		
Yes	20	7.8
No	236	92.2
Level of education		
College or below	22	8.6
Undergraduate	136	53.1
Postgraduate and above	98	38.3
Years of working		
Under 5 years	119	46.5
6–10 years	87	34.0
More than 11 years	50	19.5
Professional titles		
Junior	143	55.9
Intermediate	96	37.5
Senior	17	6.6

TABLE 3 | Comparison of depression, anxiety, and stress among dentists with different demographic characteristics.

Demography feature	Depression (n = 85, 33.2%)			χ^2	p	Anxiety (n = 95, 37.1%)			χ^2	p	Pressure (n = 88, 34.4%)			χ^2	p
	Mild	Moderate	Severe			Mild	Moderate	Severe			Mild	Moderate	Severe		
Gender				4.31	0.23				1.22	0.748				0.58	0.901
Male	7.8%	9.1%	11.7%			3.9%	15.6%	14.3%			11.7%	14.3%	7.8%		
Female	11.7%	16.2%	7.3%			7.3%	16.8%	14.5%			14.0%	11.7%	8.9%		
Age				13.46	0.14				9.04	0.434				19.69	0.200
21–30	7.4%	8.3%	7.4%			5.6%	12.0%	11.1%			7.4%	8.3%	5.6%		
31–40	13.8%	18.7%	8.1%			7.3%	20.3%	15.4%			17.9%	17.1%	9.8%		
41–50	11.8%	17.6%	11.8%			0%	17.6%	23.5%			11.8%	5.9%	11.8%		
≥51	0%	12.5%	25.0%			12.5%	12.5%	25.0%			25%	12.5%	25%		
Live alone				1.07	0.79				1.04	0.792				1.94	0.585
Yes	8.8%	12.5%	7.5%			7.5%	18.8%	12.5%			13.8%	12.5%	5.0%		
No	11.4%	14.8%	9.1%			5.7%	15.3%	15.3%			13.1%	12.5%	10.2%		
Marital status				6.35	0.096				2.05	0.562				6.67	0.083
Unmarried	5.6%	11.2%	6.7%			4.5%	14.6%	12.4%			9.0%	11.2%	4.5%		
Married	13.2%	15.6%	9.6%			7.2%	17.4%	15.6%			15.6%	13.2%	10.8%		
Fertility status				7.07	0.315				7.59	0.269				11.34	0.079
None	6.8%	12.8%	6.8%			5.1%	13.7%	11.1%			10.3%	10.3%	5.1%		
1 Child	15.2%	16.2%	9.5%			6.7%	21.0%	15.2%			16.2%	17.1%	10.5%		
≥2 Children	8.8%	11.8%	11.8%			8.8%	11.8%	23.5%			14.7%	5.9%	14.7%		
Past medical history¹				19.79	0.00*				12.99	0.005*				18.12	0.00*
Yes	5.0%	15.0%	35.0%			10.0%	15.0%	40.0%			25.0%	15.0%	30.0%		
No	11.0%	14.0%	6.4%			5.9%	16.5%	12.3%			12.3%	12.3%	6.8%		
Level of education				10.67	0.099				10.85	0.093				21.93	0.001*
College or below	22.7%	22.7%	13.6%			13.6%	27.3%	18.2%			18.2%	36.4%	13.6%		
Undergraduate	9.6%	16.2%	8.8%			6.6%	19.1%	14.7%			14.0%	14.0%	8.8%		
Postgraduate and above	9.2%	9.2%	7.1%			4.1%	10.2%	13.3%			11.2%	5.1%	7.1%		
Years of working				7.97	0.240				11.89	0.065				17.58	0.007*
Under 5 years	9.2%	10.1%	6.7%			5.0%	10.9%	10.9%			9.2%	8.4%	5.9%		
6–10 years	13.8%	14.9%	9.2%			6.9%	23.0%	14.9%			19.5%	16.1%	6.9%		
More than 11 years	8.0%	22.0%	12.0%			8.0%	18.0%	22.0%			12.0%	16.0%	18.0%		
Professional title				12.03	0.061				5.28	0.508				9.43	0.151
Junior	10.5%	11.9%	9.8%			6.3%	18.2%	11.9%			11.2%	11.9%	7.7%		
Intermediate	10.4%	19.8%	4.2%			6.3%	16.7%	16.7%			15.6%	15.6%	7.3%		
Senior	11.8%	0%	23.5%			5.9%	0%	23.5%			17.6%	0%	23.5%		
Medical institution				7.11	0.311				14.09	0.029*				11.55	0.073
Public specialized hospitals	8.3%	10.3%	8.3%			5.5%	12.4%	11.0%			11.7%	9.0%	6.2%		
Pubic general hospitals	12.7%	20.0%	9.1%			10.9%	16.4%	20.0%			18.2%	12.7%	10.9%		
Private dental clinics	14.3%	17.9%	8.9%			3.6%	26.8%	17.9%			12.5%	21.4%	12.5%		

¹ The “Past medical history” means heart diseases, hypertension, diabetes, hepatitis, nephritis and other systemic diseases.

*p < 0.05.

TABLE 4 | Univariate linear regression analysis of the status of depression, anxiety, and/or stress among dentists during the COVID-19 epidemic.

Variables	Depression (DASS-42)		Anxiety (DASS-42)		Stress (DASS-42)	
	β (95%CI)	P	β (95%CI)	P	β (95%CI)	P
Marital status	0.099 (0.420,3.818)	<0.01	0.069 (−0.801,2.868)	0.268	0.146 (0.435, 4.836)	<0.05
Fertility status	0.086 (−0.438,2.464)	0.171	0.119 (−0.038,2.460)	0.057	0.177 (0.679, 3.675)	<0.01
General health status	−0.383 (−4.874,−2.638)	<0.01	−0.381 (−4.187,−2.254)	<0.01	−0.429 (−5.533, −3.248)	<0.01
Level of education	−0.126 (−3.311,−0.50)	<0.05	−0.107 (−2.644,0.178)	0.087	−0.209 (−4.581, 1.222)	<0.01
Years of working	0.138 (0.170,2.770)	<0.05	0.168 (0.423,2.657)	<0.01	0.206 (0.947, 3.630)	<0.01
Participation in outbreak-related work	0.064 (1.164,3.671)	0.308	0.105 (−0.298,3.862)	0.093	0.145 (0.457, 5.466)	<0.05
The influence degree of life and work	0.140 (0.188,2.866)	<0.05	0.160 (0.364,2.669)	<0.01	0.177 (0.634, 3.415)	<0.01
The influence degree of sleeping	0.163 (0.323,2.230)	<0.01	0.154 (0.213,1.863)	<0.05	0.190 (0.561, 2.544)	<0.01
Lacking of cognition of prevention	0.172 (0.770,4.502)	<0.01	0.195 (0.974,4.183)	<0.01	0.168 (0.743, 4.645)	<0.01
Worried about occupational exposure/virus infection	0.148 (0.383,3.985)	<0.05	0.161 (0.497,3.601)	<0.01	0.229 (1.677,5.381)	<0.01
Lacking of prevention and control materials	0.121 (0.018,3.172)	0.053	0.141 (0.215,2.963)	<0.05	0.137 (0.205,3.531)	<0.05
Overtime work during the epidemic	0.154 (0.309,2.693)	<0.05	0.166 (0.373,2.427)	<0.01	0.193 (0.736,3.209)	<0.01
Water and electricity supply, transportation security	0.171 (0.853,5.049)	<0.01	0.126 (0.054,3.702)	<0.05	0.162 (0.715,5.106)	<0.01
Noguarantee of income	0.136 (0.230,4.398)	<0.05	0.087 (−0.528,3.091)	0.164	0.089 (0.605,3.772)	0.155
Worried about participating in supporting	0.136 (0.355,6.602)	<0.05	0.145 (0.498,5.885)	<0.05	0.148 (0.699,7.214)	<0.05
Stress has nowhere to go, and the need for psychological counseling cannot be met	0.324 (3.693,7.861)	<0.01	0.279 (2.468,6.122)	<0.01	0.280 (3.009,7.428)	<0.01
Continuous work of exhaustion	0.220 (1.675,5.745)	<0.01	0.234 (1.654,5.157)	<0.01	0.226 (1.865,6.111)	<0.01
Guilt for not being able to take care of family	0.096 (−0.448,3.594)	0.126	0.097 (−0.364,3.126)	0.120	0.144 (0.372,4.571)	<0.05
Fear of infection from colleagues	0.076 (−0.841,3.585)	0.223	0.108 (−0.224,3.587)	0.083	0.151 (0.539,5.124)	<0.05

(34.4%) showed stress. The results showed statistically significant differences in depression, anxiety, and stress in the general health status ($p < 0.05$). There was a statistical difference in anxiety states among dentists in different medical institutions ($p < 0.05$). Likewise, there were statistically significant differences in stress states between different educational levels and different working years ($p < 0.05$), as shown in **Table 3**.

Univariate Linear Regression Analysis of Depression, Anxiety, and Stress Status Among Dentists During the COVID-19 Epidemic

The factors that may affect dentists' depression, anxiety, and stress state during the epidemic period were taken as independent

variables. The total depression, anxiety, and stress scores in the DASS-42 scale were taken as dependent variables to conduct a one-way linear regression analysis. The results show that the influencing factors: "years of working," "the influence degree of life and work," "the influence degree of sleeping," "lacking cognition of prevention," "worry about occupational exposure/virus infection," "overtime work during the epidemic," "water and electricity supply, transportation security," "worried about participating in supporting," "stress has nowhere to go, and the need for psychological counseling cannot be met," and "continuous exhaustion from work" is positively correlated with depression, anxiety, and stress ($p < 0.05$). "General health status" was inversely related to depression, anxiety, and stress ($p < 0.05$), "marital status" was positively correlated with depression and stress ($p < 0.05$), "level of education" was negatively associated with depression and stress ($p < 0.05$), "lacking prevention and control materials" was positively correlated with anxiety and stress ($p < 0.05$), and "no guarantee of income" was positively associated with depression ($p < 0.05$). Furthermore, "fertility status," "participation in outbreak-related work," "guilt for not being able to take care of family," and "fear of infection from colleagues" were positively associated with stress ($p < 0.05$). See Table 4 for details.

Multivariate Analysis of Depression, Anxiety, and Stress Status Among Dentists During the COVID-19 Epidemic

Based on the one-way linear analysis, multiple linear regression analysis was performed based on the statistically significant variables in the DASS-42 scale and the dependent variables for the total scores of depression, anxiety, and stress. The results showed that the depression status was positively correlated with "years of working," "no guarantee of income," "stress has nowhere to go, and the need for psychological counseling cannot be met," and negatively correlated with "general health status" ($R^2 = 0.262$, $p < 0.05$). The anxiety status was positively correlated with "years of working," "stress has nowhere to go, and the need for psychological counseling cannot be met," "lack of prevention and control materials," and was negatively correlated with "general health status" ($R^2 = 0.243$, $p < 0.05$). The stress status was positively correlated with "years of working," "level of education," "worried about occupational exposure/viral infection," "overtime work during the outbreak," "stress has nowhere to go, and the

need for psychological counseling cannot be met," and was negatively correlated with "general health status" ($R^2 = 0.332$, $p < 0.05$). The details are shown in Tables 5–7.

Results of Perceived Wellness Survey

As shown in Table 8, we found no significant difference in the mean of PWS between different demographic groups. Correlation analysis was carried out between the six PWS subscales and the depression, anxiety, and stress scores. The results showed a positive correlation between emotional and anxiety scores ($p < 0.05$). The social domain was negatively correlated with depression, anxiety, and stress ($p < 0.05$). The physical domain was negatively correlated with depression and stress ($p < 0.05$). Furthermore, the spiritual domain was positively associated with depression, anxiety, and stress ($p < 0.05$), as shown in Table 9.

DISCUSSION

COVID-19 affects physical health and has a significant psychological impact globally (18). The following conclusions were drawn from our research: first, there were 33.2% for depression, 34.4% for anxiety, and 34.4% for stress among the 256 dentists in Shaanxi Province. Second, after analysis, we found many influencing factors that could lead to depression, anxiety,

TABLE 6 | Multiple linear regression analysis of dentists' anxiety status during the COVID-19 epidemic.

Variable	Anxiety (DASS-42 score)	
	β (95%CI)	p
General health status	-0.332 (-3.661, -1.793)	0.000
Years of working	0.136 (0.229, 2.264)	0.017
Lacking of prevention and control materials	0.130 (0.277, 3.179)	0.020
Stress has nowhere to go, and the need for psychological counseling cannot be met	0.259 (2.292, 5.671)	0.000

TABLE 7 | Multiple linear regression analysis of dentists' stress status during the COVID-19 epidemic.

Variable	Stress (DASS-42 Score)	
	β (95%CI)	p
General health status	-0.366 (-4.824, -2.665)	0.000
Level of education	-0.155 (-3.702, -0.610)	0.006
Years of working	0.118 (0.088, 2.532)	0.036
Worried about occupational exposure/viral infection	0.146 (0.620, 3.871)	0.007
Overtime work during the outbreak	0.111 (0.027, 2.227)	0.045
Stress has nowhere to go, and the need for psychological counseling cannot be met	0.226 (2.246, 6.165)	0.000

TABLE 5 | Multiple linear regression analysis of dentists' depression status during the COVID-19 epidemic.

Variable	Depression (DASS-42 score)	
	β (95% CI)	p
General health status	-0.332 (-4.319, -2.190)	0.000
Years of working	0.138 (0.300, 2.623)	0.014
No guarantee of income	0.127 (0.328, 3.984)	0.021
Stress has nowhere to go, and the need for psychological counseling cannot be met	0.303 (3.472, 7.334)	0.000

and stress. Third, there was a correlation between perceived health findings and depression, anxiety, and stress.

From previous research, it has been found that COVID-19 has a profound impact on the dental industry (19). The unique work environment puts dentists at a high risk of exposure and

infection (20). In addition, isolation, unemployment, and fear of infecting family members can influence dentists' mental health status during the COVID-19 pandemic (21). In our study, 95% of subjects were concerned about occupational exposure or viral infection, and 33% were worried about infection from colleagues. This finding is similar to many studies in which more than 80% of dentists fear infection in diagnosis and treatment by Zeina Nasser et al. (22). Additionally, Consolo et al. (23) found that nearly 85% of dentists were concerned about infection in daily clinical practice. In our univariate linear regression analysis of the factors affecting depression, anxiety, and stress status, we found that "fear of occupational exposure/viral infection" was positively associated with depression, anxiety, and stress ($p < 0.05$). Some dentists said they felt anxiety about treating patients with cough and fever (24). In our survey, 23.1% of dentists participated in outbreak-related operations (such as supporting nucleic acid sampling, pre-testing, triage, supporting fever clinics, vaccination, etc.), which was an influential factor of stress ($p < 0.05$). Furthermore, among our study subjects, 65.2% of the dentists were married, and 68.8% lived with their family members. When faced with a high-risk working environment and concerns about their family members, depression and anxiety were more likely to occur or aggravate these concerns, just as we observed. These results are the same as during the 2003 SARS outbreak. Looking back at the SARS epidemic in 2003, many studies found that medical staff had anxiety, depression, and stress symptoms at that time (25). They were afraid of occupational exposure at work, fearful of bringing the disease to family members and friends, and even reluctant to work or considered quitting the job (26). Collectively, these all can have long-term psychological effects (27).

Due to the requirements of epidemic prevention and control during the epidemic, some medical institutions have had to suspend treatment, especially private clinics. This puts a strain on dentists working in private practices. During the outbreak in India, 60.4% of oral clinics were closed for 2–3 months, 32.6% for 1 month, and 3.3% did not re-open after closure (28). Due to the closure of private oral clinics, 72.5% were worried about economic losses during the COVID-19 outbreak, and 37% of Vietnamese dental surgeons even though they were at a low quality of life level, which caused great stress and anxiety for dental practitioners working in private clinics (29). Our study found that dentists working in government hospitals account for more depression, anxiety, and stress (45.9, 44.2, and 44.3%). However, this result is different from previous studies. In previous studies (30), dentists working in clinics were significantly more stressed during the pandemic than

TABLE 8 | Perceived wellness survey (PWS) comparison with different demographic characteristics.

Demographic characteristics	Perceived wellness mean (SD)	<i>p</i>
Gender		
Male	134.35 (25.74)	0.094
Female	129.11 (21.47)	
Age		
21–30	129.48 (23.48)	0.436
31–40	131.98 (22.08)	
41–50	133.94 (18.54)	
≥51	120.13 (34.90)	
Live alone		
Yes	134.50 (29.82)	0.073
No	128.95 (18.81)	
Marital status		
Unmarried	128.75 (27.00)	0.325
Married	131.72 (20.43)	
Fertility status		
None	128.93 (25.37)	0.494
1 Child	131.73 (22.10)	
≥2 Children	133.50 (15.28)	
Past medical history		
Yes	138.10 (41.45)	0.132
No	130.06 (15.28)	
Level of education		
College or below	130.09 (24.42)	0.159
Undergraduate	128.98 (19.79)	
Postgraduate and above	133.91 (21.78)	
Years of working		
Under 5 years	129.22 (23.48)	0.696
6–10 Years	132.98 (22.65)	
More than 11 years	130.30 (22.36)	
Professional title		
Junior	128.94 (18.28)	0.343
Intermediate	133.98 (27.73)	
Senior	126.65 (27.36)	
Medical institution		
Public specialized hospitals	130.09 (24.42)	0.471
Public general hospitals	128.98 (19.79)	
Private Dental Clinics	133.91 (21.78)	

TABLE 9 | Bivariate correlation analysis of PWS subscales with depression, anxiety, and stress.

	Physical		Emotional		Social		Psychological		Spiritual		Intellectual	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Depressed	−0.060	0.337	0.113	0.070	−0.192**	0.002	−0.133*	0.033	0.198**	0.001	−0.100	0.109
Anxious	0.002	0.973	0.142*	0.023	−0.126*	0.044	−0.045	0.477	0.202**	0.001	−0.022	0.730
Stress	−0.055	0.382	0.083	0.185	−0.207**	0.001	−0.124*	0.047	0.125*	0.045	−0.101	0.107

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

dentists in government hospitals. These findings may be related to the closure of dental clinics during the epidemic and the inability to guarantee the dentist's income (31). We analyzed the possible reasons: (1) When private clinics are closed, government hospitals take on more patients, dentists' workload increases, working hours are longer, and the risk of infection increases, so they are more likely to produce psychological problems, such as anxiety and stress. (2) Among the study subjects, more doctors were working in government hospitals, so there may be a deviation in the sample results. Interestingly, our study found that education level was inversely associated with stress status, which was similar to Chen et al. (32).

Our study found that the impact of the pandemic on sleep was positively correlated with depression, anxiety, and stress status. There was an increasing number of evidence of a bidirectional relationship between psychosomatic conditions and insomnia, and this relationship may increase with stress (33). The study by Magdalena et al. also confirmed this relationship (34). Additionally, Lee et al. (35) found that sleep quality was inversely correlated with anxiety. Furthermore, many researchers have pointed out the effects of stress and anxiety on sleep (36).

A highlight of this study is that we used the PWS to evaluate subjects' mental health status in six dimensions: physical, emotional, social, psychological, spiritual, and intellectual. This survey is not commonly used in relevant studies in China. Epidemiological researchers have concluded that self-health perception is one of the most powerful predictors of their future health status (17). The perceived wellness model was built on system theory and health orientation. According to systems theory, each part of a system was a sub-element of a more extensive and separate system with its sub-elements, and the elements were interrelated (37). In the correlation analysis of PWS subscales and depression, anxiety, and stress status, we found that (1) Physical and intellectual domains were inversely associated with depression and stress status; (2) Social domain was inversely associated with depression, anxiety, and stress status; (3) Spiritual domain was positively correlated with depression, anxiety, and stress status. There were correlations between the various dimensions of PWS and between each dimension and depression, anxiety, and stress level, indicating that multiple factors influenced an individual's physical and mental health status. Another noteworthy aspect of our study was that general health status was negatively correlated with depression, anxiety, and stress. Other than that, the general health status is also related to perceived wellness. Previous studies (38) have shown that the degree of physical health was inversely correlated with the incidence of mental illness. Good perceived health and high levels of physical health were positively correlated and negatively correlated with physical and mental illnesses (39).

A comparative analysis of changes in mental health status in different periods cannot be conducted from our study

since our investigation was conducted over a brief period, did not involve dynamic and continuous monitoring, and lacked records of dentists' mental health status in different periods. Notably, the following psychological interventions are proposed in the "Guiding Principles for Emergency Psychological Crisis Intervention in the Novel Coronavirus Pneumonia Epidemic" issued by the National Health Commission: (1) Reasonable scheduling to ensure adequate sleep and diet; (2) Communicate more with family and friends; (3) Moderate exercise is beneficial to relieve the state of high mental tension, eliminate tension, release psychological pressure, promote deep sleep, and ensure medical staff's physical and psychological health.

To sum up, the COVID-19 epidemic has indeed affected the psychology of dentists to varying degrees. Physical health, years of working, income, and working conditions during the epidemic were all related to the mental health of dentists. Therefore, it is very important to pay attention to the mental health of dentists and establish an effective psychological intervention system to reduce the psychological damage caused by the epidemic.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Medical Ethics Committee of Xi'an Jiaotong University, Hospital of Stomatology, No. xjkqll (2022)NO.001. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JL analyzed the data and wrote the manuscript. CC modified the manuscript. All authors worked together to design the study proposal and questionnaires and contributed to the article and approved the submitted version.

ACKNOWLEDGMENTS

We thank AiMi Academic Services (www.aimieditor.com) for the English language editing and review services. We would like to express our sincere thanks to Xi'an Jiaotong University, Hospital of Stomatology. All participants are grateful for their contributions to this study. Finally, we would like to thank all the health workers who have contributed to this battle against the COVID-19.

REFERENCES

- Statement on the Second Meeting of the International Health Regulations. *Emergency Committee Regarding the Outbreak of Novel Coronavirus (2019-nCoV)* [EB/OL]. (2005). Available online at: [https://www.who.int/news/item/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news/item/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)) (accessed February 23, 2020).
- WHO. *WHO COVID-19 Dashboard _ WHO COVID-19 Dashboard With Vaccination Data* [EB/OL]. Geneva: WHO (2020).
- Bhumireddy J, Mallineni SK, Nuvvula S. Challenges and possible solutions in dental practice during and post COVID-19. *Environ Sci Pollut Res.* (2021) 28:1275–7. doi: 10.1007/s11356-020-10983-x
- Olszewska-Czyz I, Sozkes S. Anxiety levels among polish and turkish dentists during the COVID-19 pandemic. *Healthcare.* (2022) 10:357. doi: 10.3390/healthcare10020357
- Baghizadeh Fini M. What dentists need to know about COVID-19. *Oral Oncol.* (2020) 105:104741.
- Tysiac-Miśta M, Dziedzic A. The attitudes and professional approaches of dental practitioners during the COVID-19 outbreak in Poland: a cross-sectional survey. *Int J Environ Res Public Health.* (2020) 17:4703. doi: 10.3390/ijerph17134703
- Passarelli PC, Rella E, Manicone PF, Garcia-Godoy F, D'Addona A. The impact of the COVID-19 infection in dentistry. *Exp Biol Med (Maywood).* (2020) 245:940–4.
- Zhang C, Peng D, Lv L, Zhuo K, Yu K, Shen T, et al. Individual perceived stress mediates psychological distress in medical workers during COVID-19 epidemic outbreak in Wuhan. *Neuropsychiatr Dis Treat.* (2020) 16:2529–37. doi: 10.2147/NDT.S266151
- Baghizadeh Fini M. Oral saliva and COVID-19. *Oral Oncol.* (2020) 108:104821.
- Xu J, Li Y, Gan F, Du Y, Yao Y. Salivary Glands: potential reservoirs for COVID-19 asymptomatic infection. *J Dental Res.* (2020) 99:989–989. doi: 10.1177/0022034520918518
- Ahmed MA, Jouhar R, Ahmed N, Adnan S, Aftab M, Zafar MS, et al. Fear and practice modifications among dentists to combat novel Coronavirus Disease (COVID-19) outbreak. *Int J Environ Res Public Health.* (2020) 17:2821. doi: 10.3390/ijerph17082821
- Ali AM, Green J. Factor structure of the depression anxiety stress Scale-21 (DASS-21): unidimensionality of the Arabic version among Egyptian drug users. *Substance Abuse Treat Prevent Policy.* (2019) 14:40. doi: 10.1186/s13011-019-0226-1
- Makara-Studzinska M, Tyburski E, Załuski M, Adamczyk K, Mesterhazy J, Mesterhazy A. Confirmatory factor analysis of three versions of the depression anxiety stress scale (DASS-42, DASS-21, and DASS-12) in Polish adults. *Front Psychiatry.* (2022) 12:770532. doi: 10.3389/fpsy.2021.770532
- Phan H, Mills AR, Fleming J. Perceived wellness among pharmacy residents during COVID-19. *J Am Pharm Assoc.* (2021) 61:e52–9.
- Harari MJ, Waehler CA, Rogers JR. An empirical investigation of a theoretically based measure of perceived wellness. *J Counsel Psychol.* (2005) 52:93–103.
- Adams T, Bezner J, Steinhardt M. The conceptualization and measurement of perceived wellness: integrating balance across and within. *Am J Health Promot.* (1997) 3:208–18.
- Adams TB, Bezner JR, Drabbs ME, Zambarano RJ, Steinhardt MA. Conceptualization and measurement of the spiritual and psychological dimensions of wellness in a college population. *J Am Coll Health.* (2000) 48:165–73. doi: 10.1080/07448480009595692
- Hossain MM, Tasnim S, Sultana A, Faizah F, Mazumder H, Zou L, et al. Epidemiology of mental health problems in COVID-19: a review [version 1; peer review: 2 approved]. *F1000 Research.* (2020) 9:636.
- Vergara-Buenaventura A, Chavez-Tuñon M, Castro-Ruiz C. The mental health consequences of coronavirus disease 2019 pandemic in dentistry. *Disaster Med Public Health Preparedness.* (2020) 14:e31–4.
- Tao J, Lin Y, Jiang L, Zhou Z, Zhao J, Qu D, et al. Psychological impact of the COVID-19 pandemic on emergency dental care providers on the front lines in China. *Int Dental J.* (2021) 71:197–205. doi: 10.1016/j.identj.2020.12.001
- Sharma S, Parolia A, Kanagasingam S. A review on COVID-19 mediated impacts and risk mitigation strategies for dental health professionals. *Eur J Dentistry.* (2020) 14:S159–64. doi: 10.1055/s-0040-1718240
- Nasser Z, Fares Y, Daoud R, Abou-Abbas L. Assessment of knowledge and practice of dentists towards coronavirus disease (COVID-19): a cross-sectional survey from Lebanon. *BMC Oral Health.* (2020) 20:281. doi: 10.1186/s12903-020-01273-6
- Consolo U, Bellini P, Bencivenni D, Iani C, Checchi V. Epidemiological aspects and psychological reactions to COVID-19 of dental practitioners in the Northern Italy districts of Modena and Reggio Emilia. *Int J Environ Res Public Health.* (2020) 17:3459. doi: 10.3390/ijerph17103459
- Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. *J Dental Res.* (2020) 99:481–7.
- Bai Y, Lin CC, Lin CY, Chen JY, Chue CM, Chou P. Survey of stress reactions among health care workers involved with the SARS outbreak. *Psychiatr Serv.* (2004) 55:1055–7.
- Maunder R, Hunter J, Vincent L, Bennett J, Peladeau N, Leszcz M, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ.* (2003) 168:1245–51.
- Lee AM, Wong JG, McAlonan GM, Cheung V, Cheung C, Sham PC, et al. Stress and psychological distress among SARS survivors 1 year after the outbreak. *Can J Psychiatry.* (2007) 52:233–40. doi: 10.1177/070674370705200405
- Patil AP, Magdum D, Jadhav S, Jadhav A, Vhatkar P, Kavle PG. Stress and financial burden faced by dentists amidst COVID 19 pandemic. *J Pharm Res Int.* (2021) 33:303–10.
- Tran TT, Vo TV, Hoang TD, Hoang MV, Tran NTQ, Colebunders R. Adherence to COVID-19 preventive measures among dental care workers in Vietnam: an online cross-sectional survey. *Int J Environ Res Public Health.* (2022) 19:481. doi: 10.3390/ijerph19010481
- Mishra S, Singh S, Tiwari V, Vanza B, Khare N, Bharadwaj P. Assessment of level of perceived stress and sources of stress among dental professionals before and during the COVID -19 outbreak. *J Int Soc Prev Community Dent.* (2020) 10:794–802. doi: 10.4103/jispcd.JISPCD_340_20
- Gupta S, Hrishu TS, Gupta S, Kumar S, Javadi H, Gupta R. Challenges faced by dental professionals during COVID-19- a cross sectional survey. *JAIM.* (2020) 9:60–4.
- Chen Y, Li W. Influencing factors associated with mental health outcomes among dental medical staff in emergency exposed to coronavirus disease 2019: a multicenter cross-sectional study in China. *Front Psychiatry.* (2021) 12:736172. doi: 10.3389/fpsy.2021.736172
- Sirajudeen MS, Dilshad M, Alqahtani M, Alzhrani M, Albougami A, Somasekharan P. Psychometric properties of the Athens insomnia scale in occupational computer users. *Healthcare.* (2020) 8:89. doi: 10.3390/healthcare8020089
- Iorga M, Iurcov R, Pop L. The Relationship between fear of infection and insomnia among dentists from oradea metropolitan area during the outbreak of SARS-CoV-2 pandemic. *J Clin Med.* (2021) 10:2494. doi: 10.3390/jcm10112494
- Xiao H, Zhang Y, Kong D, Li S, Yang N. The effects of social support on sleep quality of medical staff treating patients with coronavirus disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci Monitor.* (2020) 26:e923549. doi: 10.12659/MSM.923549
- Oladunjoye A, Oladunjoye O. An evolving problem—mental health symptoms among health care workers during COVID-19 pandemic. *Asian J Psychiatry.* (2020) 54:102257. doi: 10.1016/j.ajp.2020.102257
- Rothmann S, Ekkerd J. The validation of the perceived wellness survey in the south african police service. *SA J Indust Psychol.* (2007) 33:35–42.
- Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 COVID-19 epidemic among the general population in China. *Int J Environ Res Public Health.* (2020) 17:1729. doi: 10.3390/ijerph17051729

39. Keller S. What does mental health have to do with well-being? *Bioethics*. (2019) 34:228–34.

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OPEN ACCESS

EDITED BY

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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

RECEIVED 30 May 2022

ACCEPTED 04 July 2022

PUBLISHED 27 July 2022

CITATION

Mediavilla R, Monistrol-Mula A,
McGreevy KR, Felez-Nobrega M,
Delaire A, Nicaise P, Palomo-Conti S,
Bayón C, Bravo-Ortiz M-F,
Rodríguez-Vega B, Witteveen A,
Sijbrandij M, Turrini G, Purgato M,
Vuillermoz C, Melchior M,
Petri-Romão P, Stoffers-Winterling J,
Bryant RA, McDaid D, Park A-L,
Ayuso-Mateos JL and RESPOND
Consortium (2022) Mental health
problems and needs of frontline
healthcare workers during the
COVID-19 pandemic in Spain: A
qualitative analysis.
Front. Public Health 10:956403.
doi: 10.3389/fpubh.2022.956403

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McGreevy, Felez-Nobrega, Delaire,
Nicaise, Palomo-Conti, Bayón,
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Mental health problems and needs of frontline healthcare workers during the COVID-19 pandemic in Spain: A qualitative analysis

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Background: Healthcare workers (HCWs) from COVID-19 hotspots worldwide have reported poor mental health outcomes since the pandemic's beginning. The virulence of the initial COVID-19 surge in Spain and the urgency for rapid evidence constrained early studies in their capacity to inform mental health programs accurately. Here, we used a qualitative research design to describe relevant mental health problems among frontline HCWs and explore their association with determinants and consequences and their implications for the design and implementation of mental health programs.

Materials and methods: Following the Programme Design, Implementation, Monitoring, and Evaluation (DIME) protocol, we used a two-step qualitative research design to interview frontline HCWs, mental health experts, administrators, and service planners in Spain. We used Free List (FL) interviews to identify problems experienced by frontline HCWs and Key informant (KI) interviews to describe them and explore their determinants and consequences, as well as the strategies considered useful to overcome these problems.

We used a thematic analysis approach to analyze the interview outputs and framed our results into a five-level social-ecological model (intrapersonal, interpersonal, organizational, community, and public health).

Results: We recruited 75 FL and 22 KI interviewees, roughly balanced in age and gender. We detected 56 themes during the FL interviews and explored the following themes in the KI interviews: fear of infection, psychological distress, stress, moral distress, and interpersonal conflicts among coworkers. We found that interviewees reported perceived causes and consequences across problems at all levels (intrapersonal to public health). Although several mental health strategies were implemented (especially at an intrapersonal and interpersonal level), most mental health needs remained unmet, especially at the organizational, community, and public policy levels.

Conclusions: In keeping with available quantitative evidence, our findings show that mental health problems are still relevant for frontline HCWs 1 year after the COVID-19 pandemic and that many reported causes of these problems are modifiable. Based on this, we offer specific recommendations to design and implement mental health strategies and recommend using transdiagnostic, low-intensity, scalable psychological interventions contextually adapted and tailored for HCWs.

KEYWORDS

psychological distress, mental health, occupational health, healthcare workers (HCWs), COVID-19, free list interviews, key informant interviews, qualitative study

Introduction

Since the beginning of the COVID-19 pandemic, healthcare workers (HCWs) from pandemic hotspots around the world have reported mental health symptoms such as anxiety, depression, acute and posttraumatic stress, and insomnia (1–5). Pre-pandemic cohort studies are lacking, and we cannot know whether these problems were more prevalent after the COVID-19 outbreak (6); however, follow-up studies suggest that they might persist for at least 1 year (7–10), leading to exhaustion and resignation (11). With new variants and surges of the virus pressuring health systems worldwide (12) and concerning evidence of job quit and turnover (13–15), reducing the mental health toll of the pandemic on essential workers remains necessary.

The initial outbreak was virulent and largely unpredictable in European pandemic hotspots, such as Spain. By March 31st, 2020–2 weeks after the start of the first national lockdown–, the Spanish regions of Madrid and Catalonia had already reported 29,840 and 19,991 confirmed cases of COVID-19 infections, and excess mortality rates in the previous week had risen to 95% and 43%, respectively (16, 17). In Madrid, where 15% of all COVID-19 cases were HCWs (18), the critical care requirements were five times higher than before the pandemic as of April 1st (19). This enormous pressure on health systems brought a worldwide call for protecting HCWs, both physically and psychologically

(20). Mounting evidence soon started to identify risk factors of poor mental health among HCWs, including personal factors such as being female or having a history of mental health disorders (3, 21, 22); occupational factors such as being directly involved in the clinical care of COVID-19 patients, reporting insufficient access to personal protective equipment (PPE), or being afraid of getting infected and/or infecting loved ones (21–26); or ecological factors, such as the epidemic indicators at the local level (22). In Spain, these results rapidly transferred to specific easy-to-access programs, including hotlines, ultra-brief stress management sessions at the workplace, and psychotherapy sessions tailored for HCWs (27, 28).

Even though timely and appropriate, these mental health programs had to rely on either evidence from previous epidemics or early studies constrained by the urgency of health policies following the first COVID-19 surge. In the first case, most available data came from Asian countries affected by the SARS (29) or the Middle-East Respiratory Syndrome (MERS) (30), which hindered the transportability of their results into Europe and therefore could hardly contribute to the design and implementation of mental health strategies. Moreover, although there are evident similarities between these outbreaks and the COVID-19 pandemic, significant differences in the epidemic trajectories make extrapolation of findings challenging (31, 32). Nevertheless, findings of the mental health burden among HCWs during the COVID-19

crisis align with previous epidemics studies (33). In the second case, most studies relied exclusively on survey designs that estimated the incidence of mental health problems and generated causal models, often without approaching the full range of potential mental health problems or analyzing relevant stakeholders' perspectives. Qualitative methods offer an excellent opportunity to overcome these barriers to mental health service research and delivery (34). First, they can provide a depth understanding of relevant phenomena that complement quantitative studies. In the case of a new problem with largely unknown health-related consequences, such as the COVID-19 pandemic, this has important implications for identifying relevant mental health problems, specific mental health needs, available resources (among the target population), and barriers (to the implementation of mental health programs). Second, qualitative studies stress the subjective perspectives and views of end-users and other key stakeholders, which critically enhances knowledge transfer activities, such as designing, implementing, disseminating, or scaling-up mental health programs (35). Third, qualitative studies help generate new testable hypotheses—particularly useful if prior knowledge about the phenomenon is scarce. Last, qualitative methods may be combined with quantitative methods to conduct a process evaluation of a mental health intervention program. This process can supplement the outcome evaluation of a clinical trial by expanding the knowledge into other areas, such as why a specific intervention did (or did not) work, how it was delivered, or whether there were any barriers to its implementation (36).

This study builds into the RESPOND consortium's mission to help prepare European mental health care systems for future pandemics (www.respond-project.eu). Here, we focus on two Spanish regions (Madrid and Catalonia) dramatically affected by the COVID-19 pandemic, especially during the first outbreak. We used a qualitative research design to describe relevant mental health problems among frontline HCWs and to explore their association with determinants and consequences and their implications for mental health program design and implementation. Following recommendations to bridge evidence and practice in public health (37), we interviewed community members and key stakeholders using the Programme Design, Implementation, Monitoring, and Evaluation (DIME) protocol of the John Hopkins University (38). We adopted a constructivist inquiry paradigm during our interviews (39) and a thematic analysis approach (40) during our analyses. To explore the environmental determinants of HCWs' mental health problems, we framed our results into a social-ecological model with five levels of analysis (intrapersonal, interpersonal, organizational, community, and public policy) (41), previously used among HCWs before (42) and during (43) the COVID-19 pandemic.

Materials and methods

Research design overview

We conducted a two-phase qualitative study in the Community of Madrid and Catalonia (Spain) following the DIME protocol (38). During Phase 1, we conducted a series of semi-structured Free List (FL) interviews where participants had to list the problems experienced by frontline HCWs since the beginning of the pandemic in Spain. During Phase 2, we conducted Key Informant (KI) interviews with participants who were considered knowledgeable of the reported problems by FL interviewees. Using semi-structured interviews, we asked KI interviewees about the nature, causes, and effects of the problems reported during FL interviews and what should be done about them. We analyzed these data using a thematic analyses approach (40) and interpreted our results using a social-ecological model (43).

Participants

In Spain, free, universal medical care is provided by a tax-funded decentralized National Health System. The country is divided into 17 autonomous communities that organize the service at a regional level. In this study, participants were HCWs (doctors, nurses, nursing assistants, porters, psychologists, administrative staff, and unit managers) working for the Departments of Health in the autonomous communities of Madrid and Catalonia. The Community of Madrid (capital: Madrid), with a registered population of 6,745,591 as of January 2021, had 88,717 HCWs as of October 2021. Catalonia (capital: Barcelona), with a registered population of 7,716,760 as of January 2021, had 109,346 workers as of December 2020. To be eligible, participants were HCWs who were (1) 18 years old or older, (2) on duty during the first wave of the pandemic (March 2020), (3) fluent Spanish and/or Catalan speakers, and (4) able to understand the characteristics of the study and sign the informed consent form.

The RESPOND consortium elaborated the research protocol for this study. Experience from previous studies (44–46) guided the adaptation of the DIME protocol. In Spain, interviews were conducted by a postdoctoral researcher (RM) and a Ph.D. candidate (AM-M), respectively, in Madrid and Barcelona. Both researchers were familiar with the available research on mental health and HCWs. However, they were trained in interviewing techniques following a constructivist perspective, i.e., as mere facilitators interested in understanding the problems and needs *as community members and key stakeholders understand them*. The interviewers had no prior professional or personal relationship with the interviewees.

TABLE 1 Recruitment strategies for FL and KI interviewees.

	FL interviews	KI interviews
Sampling	Stratified (non-probabilistic)	Snowball (non-probabilistic)
Recruiters	Stakeholders	FL interviewees
Recruitment strategy	MVS: gender, age group, expertise, and type of job	Knowledgeability

MVS, maximum variation sampling.

Sampling methods and recruitment strategies differed across FL and KI interviewees (see Table 1). In Phase 1 (FL interviews), we used a two-step maximum variation sampling (MVS) technique. First, we identified potential participants from three groups of interest, namely frontline HCWs (workers involved in the direct care of COVID-19 patients during the initial pandemic outbreak), mental health experts (psychiatrists, clinical psychologists, and mental health nurses), and administrators and service planners (unit coordinators, managing directors, and other decision-makers). Next, we used a matrix to ensure that we represented men and women with different expertise from the hospital and non-hospital settings. In Phase 2 (KI interviews), we asked FL participants to provide us with names of people they considered knowledgeable of their reported problems.

The study was conducted in line with the Declaration of Helsinki and was approved by the Ethics Review Boards at Hospital La Paz in Madrid (study ID: 4498) and Parc Sanitari Sant Joan de Déu in Barcelona (study ID: PIC-277–20). Participants did not receive compensation for their participation in the study, except for the KI interviewees enrolled in Catalonia (100€).

Procedure and data analysis

The interviewers (RM and AM-M) arranged, conducted, and analyzed the FL and the KI interviews, closely supervised by the local senior investigators (J-MH and J-LA-M). FL interviews were conducted between December 22nd, 2020, and March 24th, 2021, and KI interviews between April 1st and May 24th, 2021. In Madrid, all interviews were done in Spanish, while in Catalonia, they were done in Catalan or Spanish indistinctly.

Phase 1. FL interviews

We reached out to local mental health providers who were either part of or close to the RESPOND research team to recruit FL candidates. They approached potential FL candidates and asked them for verbal consent so the interviewers could contact them. Interviews were conducted as potential FL participants were referred and signed the informed consent form.

Interviews were conducted in individual format and were recorded on audio. In Madrid, they were delivered either online (*via* Zoom or Microsoft Teams) or in-person, depending on the interviewee's preferences and the COVID-19 restrictions. In Barcelona, all interviews were conducted online *via* Zoom or Microsoft Teams. Interviews took 30–45 min. Basic non-identifying information about the respondent was recorded to maintain confidentiality (age, gender, household composition, role, years of experience, and previous experience in infectious diseases emergencies), as well as interview details (interviewer, date of the interview, and interview ID). The interviewer assigned an interview ID, who kept a secured (digital) document with the identifying key. Importantly, interview questions focused on community views rather than personal disclosures—the main question was: *What are all the problems that have affected frontline health workers living in Spain since the start of the COVID-19 pandemic?* First, the interviewer asked respondents to list as many problems as they could think of and provide a short description of each problem they identified—following the DIME protocol, the primary question did not focus only on problems directly related to mental health. The respondents were then repeatedly probed to list as many responses as possible until they indicated they could think of no more. At the end of the interview, the interviewer asked the participants to think of someone knowledgeable of the problems they mentioned and whether they could be interested in taking part in Phase 2 (KI interviews). If so, we asked them to contact the person and get verbal consent so that we could contact them to sign the informed consent form.

The FL interviews analysis consolidated all data into a single list of responses for each FL question, including the number of different interviewees reporting each response. This process was done locally by the interviewers and the supervisors the day after the last interview was conducted. The procedure was as follows. The interviewers listed all the different responses from the interview forms in Spanish/Catalan, placing the interviewee ID number next to the response. If multiple interviewees reported the same problem, all the relevant ID numbers were listed next to that response. If two or more respondents referred to the same concept but used different wording, the review team selected and recorded the wording they felt was most accurate and most likely to be understood by a member of the target population (i.e., a KI interviewee).

Phase 2. KI interviews

Once the FL phase was concluded, the research team met with the mental health providers who initially approached potential FL interviewees at each study site. The problems reported in the FL interviews to be included in the KI interviews were identified during the meeting. The selection was made by consensus, considering that they were (a) mental health

problems, (b) frequently reported, and (c) potentially modifiable through mental health intervention programs.

The procedure for collecting and coding sociodemographic information and anonymizing data was the same as for the FL interviews. The main difference between FL and KI interviews was that the latter was less structured. During the KI interviews, the researcher first introduces the topic and asks a pre-defined ‘grand tour’ question (e.g., *“In the Phase 1 interviews, some of your colleagues said that frontline HCWs were afraid of getting infected –they were worried about having COVID-19, but also about infecting their loved ones, especially at home. Could you tell me a bit more about this?”*). Following this introductory question, the interviewer broke in only to probe for more information or guide the respondent back if they diverged from the topic. Next, the following questions were asked for each problem until the respondent had nothing further to say:

- The nature of the problem (e.g., *What are the characteristics/symptoms or signs? How is fear of infection recognized / how do you recognize someone who is afraid of getting infected?*)
- Perceived causes (e.g., *What do [frontline HCWs] generally perceive as the cause(s) of being afraid of getting infected?*)
- The effects on the person with the problem and others close to them (e.g., *What effect does fear of infection have on the person themselves?*)
- What do people currently do about it (e.g., *What do [frontline HCWs] do to handle this fear of infection?*)
- What should be done about it (e.g., *What should be done with the problem of having frontline workers afraid of getting infected?*)

All interviews were transcribed using an automated transcription assistant for audio data (NVivo Transcription). Next, we coded all interview transcripts using the NVivo program (NVivo 11), separately in Madrid (RM and KRM) and Barcelona (AM-M and MF-N). We did a thematic analysis to identify (a) symptoms (i.e., descriptions of the problems), (b) causes, (c) effects, and (d) actions that could be done against these problems. We included all data items that could potentially contribute to any of these categories, regardless of the moment they were mentioned during the interview (e.g., interviewees often mentioned effects when they were asked about the nature of the problem). We then performed a thematic analysis using the structure of the KI interviews as the coding frame (40). Following the DIME protocol, we first listed and calculated the frequency of each problem’s different symptoms, causes, effects, and actions (38). This information was then transferred to a summary sheet and independently reviewed by pairs of researchers in Madrid (RM and KM) and Barcelona (AM-M and MF-N). After collapsing similar categories (e.g., “the clinic did not provide adequate protective equipment,” “we did not have gloves,” and “we were clearly unprotected”), the perceived causes and effects were categorized following McLeroy’s (41)

and Hennein and Lowe’s COVID-19 social-ecological model (43), which includes five levels of analysis, namely intrapersonal, interpersonal, organization, community, and public health. If a potential cause, effect, or action, could be classified under more than one category (e.g., shortages of protective equipment could be identified as a determinant at the organization and public policy levels), we always classified it into the lowest level (e.g., organizational).

Results

We recruited 75 participants (41 in Madrid and 34 in Catalonia) during phase 1 (FL interviews) and 22 participants (10 in Madrid and 12 in Barcelona) during phase 2 (KI interviews). Their characteristics are shown in Table 2.

Phase 1. FL interviews

After combining items from two or more participants that were referring to the same problem (e.g., “insomnia” and “sleeping problems”), we identified 26 problems reported by FL interviewees in Madrid and 30 problems in Catalonia. The most frequently reported problems were similar across sites. They included lack of training and experience, fear of infection, uncertainty (about the future, the epidemiological and economic situation, etc.), excessive workload, psychological distress, insufficient protective equipment, and guilt (see Table 3).

Phase 2. KI interviews

First, we reviewed the list of problems reported during the FL interviews to decide whether any should be further combined. We only combined problems that expressed the same concept, creating broader categories (e.g., emotional problems and psychological distress). Next, we selected five problems at both study locations based on whether they were (a) mental health problems, (b) frequently reported, and (c) potentially modifiable through mental health intervention programs. The final set of problems included fear of infection, psychological distress, stress, moral distress, and interpersonal conflicts among coworkers. We collected four main themes per problem and classified them using a five-level social-ecological model, including intrapersonal, interpersonal, organizational, community, and public policy levels.

Nature of the problem, causes, and consequences

The first three themes included the nature of the problem (i.e., a description of the problem), their determinants (i.e., causes), and their consequences (i.e., effects) (see Figure 1

TABLE 2 Characteristics of the participants.

	Free list (FL) interviews			Key informant (KI) interviews		
	Total (n = 75)	Madrid (n = 41)	Catalonia (n = 34)	Total (n = 22)	Madrid (n = 10)	Catalonia (n = 12)
Age group, n (%)						
18–35	23	14	9	7	3	4
36–50	42	17	15	14	6	8
> 50	20	10	10	1	1	0
Gender						
Female	46	21	25	14	6	8
Male	29	20	9	8	4	4
Job						
Frontline worker	37	17	20	13	5	8
Mental health expert	26	16	10	8	4	4
Administrators and service planners	12	8	4			
Facility						
Hospital	36	17	19			
Non-hospital	27	16	11			
NA ^a	12	8	4	22	10	12

^aNot asked to administrators and services planners (n = 12) and to KI interviewees (n = 22).

and [Supplementary Table 1](#)). Participants' identifiers used across quotes are shown in [Supplementary Table 2](#).

Psychological distress

This problem (see [Figure 1A](#)) included various facets, such as arousal ["you can think about it in terms of arousal: you constantly felt in danger and witnessed how patients were being mistreated" (HULP50)], sleep problems ["In the beginning, I felt really strong [...] but, when I became aware that dozens of patients were dying every day, then I started to have trouble sleeping" (HULP47)], crying ["many colleagues cried all the time because they were completely overwhelmed" (HULP47); "we cried all the time, together, but I know that other nurses asked the supervisor to let them into his office to cry alone" (HULP51)], feeling lonely ["I have seen loneliness among patients mostly, but also among HCWs; many of them lost relatives or friends that they could not even bury properly and sometimes we couldn't express our condolences in person" (HULP44)] or feeling overwhelmed by the widespread uncertainty ["I felt like a first-year medical resident because I had no idea what to do (with COVID-19 patients)" (PSSJD_10)]. One informant also emphasized something positive about being distressed: "We were all feeling very fragile and on edge, and although this was bad, it also increased the group cohesion" (HULP48).

The interviewees associated the problem of psychological distress with a wide range of factors, covering the five levels of analysis: individual, interpersonal, organization, community, and public policy. Firstly, they identified the exposure to massive stressors and social withdrawal ["In some wards, everyone died;

those people had a hard time" (HULP44, quote #1); "It's been harder for workmates that have completely isolated themselves from their families" (HULP47, quote #2)]. They also mentioned that not all HCWs reacted similarly to the same stressors due to individual differences (i.e., different appraisal styles). Secondly, factors such as increased workload ["There wasn't enough time to attend adequately to all patients" (HULP47, quote #3)] and limited scientific knowledge ["What we thought we were doing well, we then found out it wasn't scientific evidence, or that further studies had proven otherwise" (PSSJD_07, quote #4)], were factors leading to low-quality care and, consequently, to psychological distress. Finally, they described a lack of support from the community ["I would do well with, for example, a working group or a team [...] where you can share your experiences and feel supported and that you are not alone" (PSSJD_01, quote #5)] and unsuccessful health policies ["The hard part of the waves [second and third] was that you continued to go to war, and you knew that the bar terrace in front of you was full of people" (HULP46, quote #6)].

Respondents related various consequences to psychological distress. At an individual level, they identified insomnia, irritability, stress, and feeling insecure. On the other hand, at an interpersonal level, they reported isolation, discussions, and distress intolerance at home. Finally, at an organizational level, they mentioned consequences such as job leave, absenteeism, and distress intolerance at work.

Fear of infection

Many respondents reported fear of infection (i.e., fear of contagion or fear of being the source of contamination of

TABLE 3 Frequency of problems reported by FL interviewees.

Madrid (<i>n</i> = 41)	
Excessive workload	21
Fear of infection/vulnerability	21
Insufficient and conflicting information, clinical protocols, and training	17
Uncertainty	17
Insufficient protective equipment	16
Institutions do not organize and coordinate work, lack of confidence in the institutions	15
Stress, anxiety	15
Exhaustion, hopelessness	14
Loneliness, sadness, neglect	11
Emotional problems (anxiety, activation level, low mood)	10
Sleeping problems, nightmares	9
Lack of recognition/understanding [+conflict between colleagues]	9
Anger, impotence, frustration	9
Work leave/Insufficient staff	8
Work adaptations (changes in job functions/workspaces)	7
Poor quality of clinical attention	5
Catalonia (<i>n</i> = 34)	
Lack of information, knowledge, training, and experience	22
Fear and uncertainty	20
Excessive workload and stress	20
Lack of PPE, material, and resources	18
Guilt, helplessness, ethical dilemma, emotionally challenging situations	16
Institutions do not organize and coordinate work	8
Anxiety	7
Abandonment and lack of support from high positions	6
Loneliness and social isolation	6
Sadness and hopelessness	6

Less than 5 participants reported the following problems: sleeping problems; stigma and lack of psychological support; worsening of previous issues; interpersonal and family problems; mental exhaustion; irritability; insecurity; dysregulation of dietary habits; emotional disorders; low relevance of less urgent issues; physical exhaustion; mood shifts; separate professional and personal matters; distrust; hallucinations; the discomfort of wearing the protective equipment; bureaucratic problems; confusion; physical problems; changes at a professional level; reconciliation of work and family life; continuous exposure to death and suffering; conflicts between coworkers; prioritization decisions; loss of leadership; inadequate psychological interventions; doubts regarding severity; relationship with patients' relatives; suicidal thoughts; alienation.

others; see Figure 1B). One of our KI interviewees, who served as a psychiatrist in a major hospital's emergency room during the first pandemic outbreak, said, "every HCW was afraid, which was reasonable given the circumstances" (HULP48). According to another interviewee, "you knew [when someone was worried about becoming infected] because they avoided social contact and constantly monitored symptoms and thought whether they might be infected" (HULP49). However, the feeling was very different "depending on the household composition"

(HULP51) because "most people were not afraid of getting infected themselves, but of taking the virus home (...), and they were anxious and irritable" (HULP46).

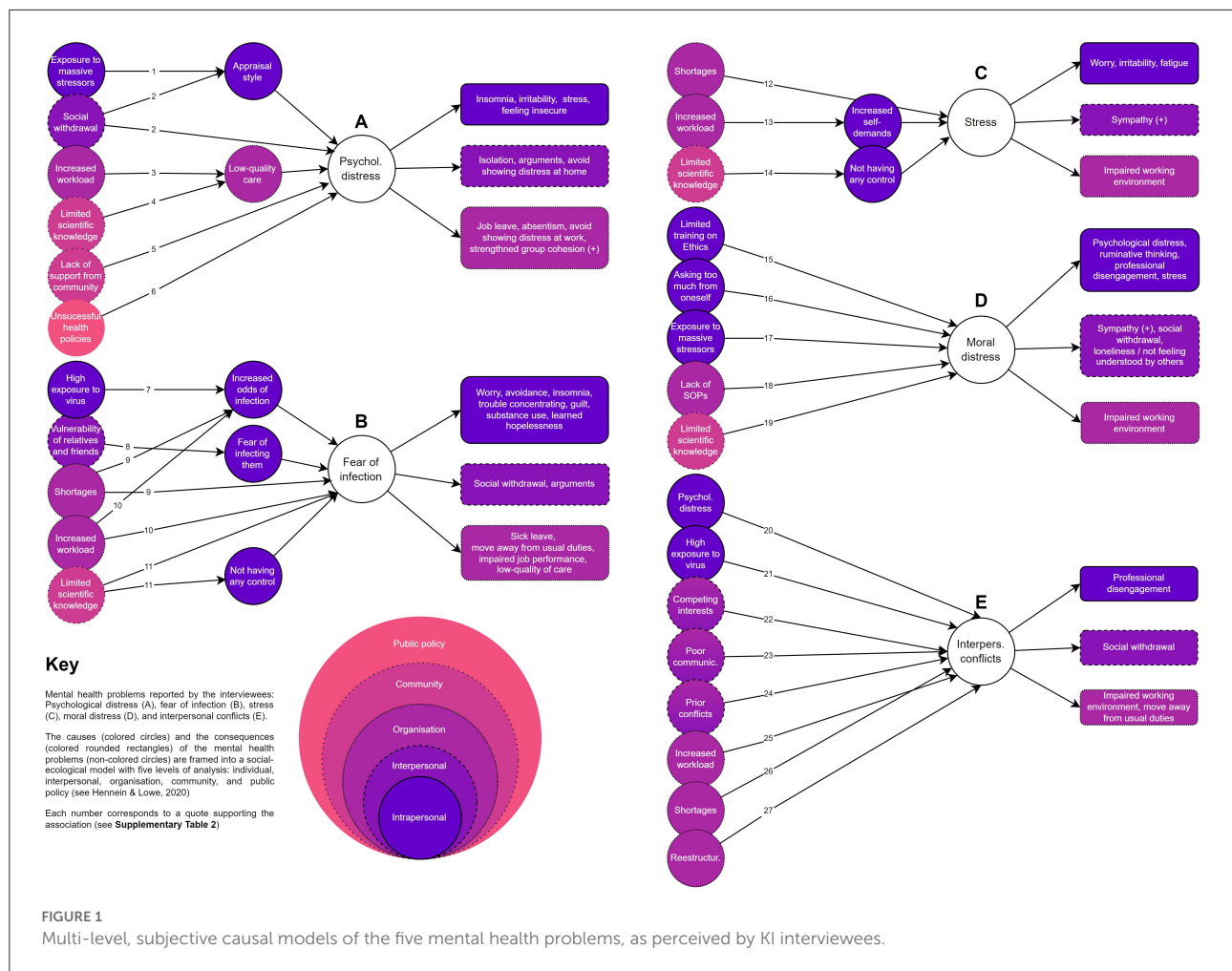
Respondents related this fear to individual, interpersonal, organizational, and community factors. For instance, they identified factors such as high exposure to the virus ["I was a lot less afraid in the first wave because I wasn't with COVID patients, but now, I see people dying every day [...], and you can't help thinking that it's going to happen to you too" (HULP49, quote#7)]. Also, shortages ("We didn't have protective gear, or we didn't know how to use it" [HULP48, quote #9]) and increased workload ["There was so much work to do you couldn't even go to the bathroom" (HULP47, quote #10)]. Moreover, all of these factors increased the odds of infection for HCWs. Respondents also reported that the level of vulnerability of relatives and friends increased the fear of infecting them ["Some work colleagues lived with their elderly mother, who had diabetes and cancer, and they didn't remove their face mask, not even in bed" (HULP51, quote #8)]. Finally, having limited access to knowledge made respondents feel like they had no control ["We didn't know how to treat this kind of patients, which were so delicate" (HULP47, quote #11)]..

According to the respondents, the fear of infection led to intrapersonal problems such as worry, avoidance, insomnia, trouble concentrating, guilt, substance use, and learned hopelessness; interpersonal problems such as social withdrawal and arguments with peers, friends, and family; and issues within the organization, with increased sick leaves, impaired job performance or low-quality of care.

Stress

Participants also reported stress (see Figure 1C). They referred to being overtaken by circumstances ["(frontline HCWs) said that they were very nervous because they were moved to other wards and had to take care of patients that they were not used to working with" (PSSJD_10)]. This situation increased their arousal levels ["HCWs were easily startled at work" (PSSJD_12)]. It also made them feel that they were not able to cope with the situation ["you forgot to do things that you would have never forgotten to do before [the pandemic] because you had a lot of things in your mind" (PSSJD_13)].

Respondents associated stress with external factors at an organizational and community level, such as shortages ("I think there are structural conditions in the hospitals, and even more so in a moment of crisis, a precariousness that leads to... I believe that stress is not only a personal problem of having resources" [PSSJD_06, quote #12]). Furthermore, from their point of view, an increased workload led to increased self-demands, which increased stress levels ("Because all of a sudden, we had an avalanche of work that we could not assimilate" [PSSJD_03, quote #13]). Finally, once again, limited access to scientific knowledge made them feel like they had no control:



What causes the problem [stress], especially in this case, is facing a novel disease and not having protocols to follow. They give you constantly changing protocols regarding syndromes and treatment; everything changes as you work. What is valid initially wasn't valid 24 or 48 h later, 2 or 3 weeks later. This led to a feeling of insecurity and stress [PSSJD_14, quote #14].

Regarding the consequences of stress, respondents identified worry, irritability, and fatigue at an individual level and an impaired working environment at an organizational level. Finally, they pointed out sympathy as a positive effect at an interpersonal level.

Moral distress

Moral distress (see Figure 1D), was characterized by a deep feeling of not doing enough for the patient in terms of care provision ("I felt guilty when patients called me, and I could not call them back [due to excessive workload]" [PSSJD_03]; "some colleagues were overwhelmed because patients died alone all the time, and they could do nothing" [PSSJD_10]), and closeness

("you eventually become less empathic and caring toward the patient" [PSSJD_04]. There was a "continuous questioning of standards and operating procedures" (PSSJD_08), which added to many people "taking responsibilities that exceeded their capacities (...) for instance, ICU doctors were distressed by having to decide who received mechanical ventilation and who didn't" (PSSJD_06).

Respondents related this problem to individual, interpersonal, organizational, and community factors, such as limited training on ethics:

The level of knowledge and thought regarding the practice of critical care is relatively low in ethical terms. I know this because of my experience in critical care units and hospitals. There is a low level of applied ethics in healthcare training programs, so suddenly, we found ourselves discussing whether one life had more value than another and whether relatives could come in or not. This line of questioning was seen negatively, but beyond the problem, I believe the effects were experienced as moral distress [PSSJD_06, quote #15].

Also, asking too much of yourself (“It comes from our need as health care workers to save lives; That instilled thing: I can do it, and I will save you or try to” [PSSJD_07, quote #16]); exposure to huge stressors (“The nature of this illness has been so terrible” [PSSJD_05, quote #17]); lack of Standard Operating Procedures (SOPs) (“Not having a precise protocol, often it’s just that, not having a clear protocol or having it but not approving it” [PSSJD_14, quote #18]); and limited scientific knowledge (“Knowing how the disease works gives you more confidence [...] I think we don’t live as much from guilt anymore, knowing that the illness has this process” [PSSJD_05, quote #19]).

According to respondents, moral distress led to personal consequences such as psychological distress, ruminating thoughts, professional disengagement, and stress. Respondents identified social withdrawal, loneliness, and not feeling understood by others at an interpersonal level. However, they mentioned sympathy as a positive effect. Finally, they identified an impaired working environment at an organizational level.

Interpersonal conflicts among coworkers

According to respondents:

It was a very complex problem. There were strong frictions between working groups [doctors, nurses, porters] because functions suddenly became blurry. Different levels of exposure [to the virus] generated rivalry; the higher the exposure, the greater the fear and the responsibility, but not the reward (HULP48).

This problem (see [Figure 1E](#)) was directly linked to trust (“we worked in pairs, and we had to take care of one another; if you didn’t know the coworkers [because of constant redeployments and reassignments], you couldn’t easily trust them” [HULP46]). This issue often results in a lack of cohesion (“when a big group of people doesn’t work well together, people tend to gather in smaller groups” [HULP50]). One of its main triggers was that “some people tried to sneak out of work, and that was a strong turning point” (HULP47).

Participants associated interpersonal conflicts with several factors. At an individual level, they mentioned psychological distress (“Factors that I have mentioned to you, like fear of infection, uncertainty, or how we are feeling, affect workplace relationships” [HULP49, quote #20]) and high exposure to the virus (“In my opinion, there were levels of exposure [to the virus] that created rivalries” [HULP48, quote #21]). At an interpersonal level, they identified the following causes: competing interests (“There can be conflicting criteria (...) It’s not that one is right and the other one wrong, but when two people think differently, there can be tension” [HULP49, quote #22]); poor communication (“Some times there are conflicts between workmates [...] in moments of tension where there is a lack of communication among us, conflicts and tensions arise” [HULP47, quote #23]); and prior conflicts (“[The pandemic]

has uncovered tensions that used to be hidden or tolerated” [HULP48, quote #24]). At an organizational level, respondents related interpersonal conflicts to an increased workload (“[There were different levels of] involvement [...], and this created differences and tensions” [HULP48, quote #25]) and shortages (“Some workmates got mad with the supervisor, who didn’t give us PPE” [HULP48, quote #26]). Also, to restructuring (“Every time we opened a new COVID one [new unit], part of the staff changed [...] there was a lack of belonging in the unit” [HULP46, quote #27]).

Ultimately, participants identified professional disengagement and social withdrawal as personal and interpersonal consequences. At an organizational level, they described an impaired working environment and the assignment of unfamiliar tasks.

Reported strategies to overcome the problems

The fourth theme contained the strategies that, according to our respondents, frontline HCWs used to cope with the reported problems (see [Figure 2](#)).

At a public health policy level, respondents only identified one strategy: developing standardized operating procedures to help overcome the fear of infection. On the other hand, many strategies were already in place at the community, organizational, interpersonal, and personal levels, namely: seeking specialized mental health care to overcome psychological distress, stress, and moral distress (“They offered group mindfulness activities that helped us relax; many people enjoyed them” [HULP46]); providing adequate personal protective equipment and building strong leadership to face the fear of infection (“Someone who knew what to do would have come in handy (...) to assure us that we wouldn’t be lacking PPEs” [HULP47]); and seeking peer support and using self-help strategies to reduce the impact of psychological distress (“Offer sessions on emotional containment, emotional intelligence, addressing things, and how not to take them home” [PSSJD_03]).

However, respondents highlighted that many strategies were not being implemented for specific problems (e.g., interpersonal problems), despite feeling they would be beneficial, especially at the public policy, community, and organizational levels. For instance, at a public policy level, respondents suggested strategies such as providing specific training on infectious diseases or improving HCWs’ working conditions to overcome psychological distress, stress, and moral distress: “Training, training, and more training. In the case of Ebola, it helped me a lot the fact that we had a lot of training; we brought the techniques well learned” (HULP44); “There’s not enough staff, and work overload is still massive (especially with this new variant, which makes patients get worse in a matter of hours” (HULP47). Furthermore, from a community perspective, they advocate destigmatizing psychological distress to face anxiety



FIGURE 2

Strategies currently implemented (blue rhombus shapes) or requiring implementation (yellow circles) to improve frontline HCWs' mental health problems, as perceived by KI interviewees.

and moral distress (“Normalize the situation, you are not on your own, and many have been through the same thing as you; together, we can improve people’s resilience and resist without tearing apart” [PSSJD_08]).

At an organizational level, respondents recommend ensuring the information flow to overcome problems such as psychological distress, fear of infection, and stress:

That fear had to be dealt with by giving information on what to do to avoid getting infected. Even if we had little information about what we were facing then, they should have conveyed a sense of tranquility, for instance, saying that you were more or less protected with good hygiene (HULP47).

In addition, to face moral distress, they bet on promoting occupational mental health and organizing focus groups with peers:

To do joint therapy, we should all get together. Well, we can’t right now, but get together in groups and talk about our experiences, about how we have been able to cope, how it’s still affecting us, and different strategies that we have put in place to bear it as best as possible (PSSJD_07).

Regarding interpersonal conflicts, respondents felt that the organization should promote collaborative work or reassign workers to other units if they feel overwhelmed (“With supervision, we have to work more as a team, talking about the problems that arise at work. We have to consider everyone’s roles, distinct responsibilities, and sensitivities” [HULP48]).

Finally, respondents identified strategies that HCWs used to deal with specific problems but considered that they should also use them with other issues. For instance, at an interpersonal level, seeking peer support to face stress, moral distress, and interpersonal conflicts, and not only to face psychological pain or fear of infection.

Discussion

In this study, we used a qualitative research design to identify and describe relevant mental health problems among frontline HCWs and explore their association with determinants and consequences at various levels as perceived by HCWs. We interviewed stakeholders from two early pandemic hotspots (Madrid and Catalonia), including frontline HCWs, mental health providers, administrators, and service planners. Our main findings, alongside implications for future research, policy, and practice, are discussed below.

Mental health matters—even after the first pandemic outbreak

The study aimed at understanding HCWs' problems and needs so that we could inform evidence-based mental health strategies. To that end, we first asked our FL interviewees to provide a list of problems (in general). We found that mental health problems were reported as frequently as life-threatening problems such as lack of training to avoid infection or PPE shortages, indicating that mental health problems are still considered relevant for HCWs almost 1 year after the first pandemic outbreak. This result is in line with evidence from longitudinal survey studies conducted in Spain (7, 9) and abroad (10, 47, 48), showing that poor mental health outcomes among HCWs tend to persist over time. In a country where one in two nurses had thought of quitting their job since the beginning of the pandemic (49), the increased levels of tiredness and exhaustion reported by some of our interviewees serve as a plausible explanation for this sustained poor mental health (“[we] had not been allowed to disconnect or deactivate [since the beginning of the pandemic]”; “[HCWs] have got used to sleeping 3 h a day and being tired”). A qualitative prospective study conducted in the UK, another European COVID-19 pandemic hotspot, supports this idea (11). Using consecutive in-depth interviews, the authors identified three pandemic phases, namely *emergency and mobilization* (late winter-spring 2020), *consolidation and preparation* (summer-early autumn 2020), and *exhaustion and survival* (late autumn 2020-winter 2021). This last phase is critical to our study as it covers our data collection period (winter 2020 and late spring 2021). Moreover, the pandemic surge corresponding to this period was milder in Spain compared to the UK. This brought about a certain sense of “fighting the virus alone” that may explain why frontline HCWs are seen by their colleagues as exhausted and psychologically distressed 1 year after the first pandemic surge. According to one of our KI interviewees, as compared to the first wave, where the country was under strict lockdown and signs of support for HCWs were shown every day, “the hardest thing during the

second and third waves was to see people crowding in bars while you had to go to war every day.”

Mental causal models supplement empirical causal models

During the KI interviews, we asked our participants about the causes and determinants of HCWs' mental health problems. Our main finding is that the perceived (i.e., subjective) causal mechanisms work at multiple levels –and, importantly, many of these subjective causal models align with epidemiological studies. This finding is in line with the multilevel models in psychiatric epidemiology, which argue that researchers exploring the determinants of mental health problems must analyse not only individual-level variables but also potential causes at higher levels (e.g., interpersonal, community, region) (50). Further, this has important implications for knowledge transfer activities (41) because it targets decision-makers at different levels (e.g., work, community, state). At the *intrapersonal level*, our primary finding was that some factors mediate exposures, such as spending time with COVID-19 patients, sharing a household with vulnerable people, or lack of scientific evidence to treat the infection and outcomes, i.e., health problems related to mental illness. From a transactional perspective, this result has a major implication. Even when the stressor is unmodifiable (e.g., living with an 80-year-old relative or vaccines not yet developed), psychological strategies can still modify mediational factors, such as fears or appraisal styles (51, 52). At the *interpersonal level*, HCWs reported determinants across various problems, which is also in line with COVID-19 studies conducted among HCWs (53, 54). Importantly, we found that perceived social isolation is a consequence of many reported problems. During the initial pandemic outbreak, HCWs in Spain were not only highly distressed and worried about infecting their loved ones; some decided to isolate themselves to protect them both physically and emotionally. Preventing HCWs from feeling alone may help reduce the negative consequences of mental health problems while increasing a key protective factor, namely social support. Importantly, reducing the so-called social support barriers (i.e., factors that reduce the use of social support, even when available) might also help improve HCWs' mental health (55). At the *organizational level*, HCWs reported common causes across problems: increased workload, shortages of protective equipment, or lack of standardized operating procedures. HCWs' mental models are thus in line with causal knowledge from epidemiological studies showing that crucial pandemic-related factors, such as having access to protective equipment or not having clear indications on how to prioritize access to mechanical ventilation, are associated with adverse mental health outcomes (21, 24). At the *community level*, our major

finding was that HCW did not report that the wider community and people in it had a negative impact on their mental health – only one interviewee mentioned not feeling supported by other people during the second and the third pandemic waves. In Spain, widespread signs of support for HCWs were displayed every day during the first half of 2020 (the so-called “*aplausos sanitarios*” or “clapping hands”), contrary to other COVID-19 hotspots around the globe (56, 57). This support can be seen as a spontaneous anti-stigma campaign that may have protected HCWs, who are often discriminated against and even attacked in other pandemic hotspots (56–59). With mounting evidence suggesting an association between reported discrimination and poor mental health outcomes among HCWs (60–62), mental health strategies at the community level could take the form of anti-stigma campaigns. Last, we found that HCWs rarely refer to determinants at the *public policy level*. The main reason is that causes described at all levels, such as increased exposure to SARS-CoV-2 (intrapersonal), the vulnerability of relatives and friends (interpersonal), shortage of protective equipment (organizational), or reduced scientific knowledge about SARS-CoV-2 (community), could be all seen as public policy issues. We described them as part of the “lower” levels because that helps tailor strategies and tackle decision-makers on the field (e.g., PPE shortage is a public health issue, but organization leaders might prevent or fix it). Moreover, while we adopted a multilevel approach when analyzing the data, we did not modify the study design, and participants were not probed for providing answers across levels.

Frequently overlooked mental health factors can inform mental health programs

We used open-ended instead of close questions during FL interviews to capture as many problems as possible without any aprioristic constraints. We found that HCWs reported internalizing symptoms such as anxiety and depression quite frequently, roughly in line with the surveys used in prior studies (3, 63). However, they also mentioned externalizing symptoms, such as anger or hostility, and transdiagnostic symptoms, such as worry, guilt, or intolerance of uncertainty. Further, we also found that most problems and their determinants and consequences were interconnected (e.g., psychological distress was one of the causes of interpersonal conflicts), in line with previous studies using the same research design (46, 64). These findings support the design of mental health programs tailored for HCWs that target psychological distress in general –instead of specific mental health syndromes. Scalable transdiagnostic interventions have proven effective before in global settings (65, 66) and during the COVID-19 pandemic (67), although

they away rigorous testing among care home workers during the COVID-19 pandemic (68). The question of whether it might help HCWs during the COVID-19 pandemic, if contextually adapted, remains unanswered.

Some needs remain unmet

One promising finding was that HCWs reported strategies being implemented at all levels to face mental health problems, mostly psychological distress and fear of infection. Importantly, even when most professional psychological support, both for HCWs and other mental health patients, was provided through phone or video calls (69), our informants said they used it to reduce their psychological distress, stress, and moral injury. Notwithstanding, most of these strategies were implemented at the intrapersonal, interpersonal, and community levels but not at the organizational or public policy levels. For instance, regarding psychological distress, our respondents reported that, whereas frontline workers used self-help techniques, sought peer support, or started psychotherapy, they did not perceive that the organization leaders or policymakers ensured information flow, promoted occupational health, hired mental health specialists, or improved working conditions. This inaction brought a widespread sense of disbelief among HCWs, who thought they were running the extra mile but did not see their needs adequately covered.

Limitations

We acknowledge the following limitations. First, we asked FL interviewees to report problems faced by frontline HCWs *since the beginning of the pandemic* without distinguishing between current and previous concerns, limiting our capacity to inform actions aimed at ameliorating ongoing problems rapidly. Second, we had to keep KI interviews as short as possible due to time and social distancing constraints. Following the research protocol, we collapsed some of the problems reported by FL interviewees, which allowed us to inquire about more problems in our KI interviews but increased the risk of losing nuances for a more fine-grained analysis –especially in heterogeneous problems like psychological distress. Third, and relatedly, we had to set aside the focus groups included in the DIME protocol due to the pressuring job duties during the third pandemic wave and the social distancing measures. Last, we followed the DIME protocol and did not probe KI interviewees for causes or strategies across levels (e.g., “*in their organization*, what do frontline HCWs generally perceive as causes of PROBLEM X?”). We may have thus missed potential determinants and strategies that are less accessible by open-ended questions, especially at the organizational and public policy levels.

Conclusion

Over the years, globalization has increased the transmission rates of diseases worldwide (70), and as the world gets more globalized, likely, future pandemics will travel faster. As of January 1st, 2021 (when data was collected), Spain showed one of the highest excess mortality rates in Europe (16%), similar to that of Italy, the USA, or Brazil (12) –a finding particularly shocking for a country with one of the best-rated national health systems in the world (71). Although our findings reflect HCWs' perceptions of problems and needs –which may not match empirical findings, these subjective views can help inform research, policy, and practice to prepare health systems for future pandemics. In terms of research, we need the high-quality data available to prepare evidence-based public health strategies. A good balance between rapid and in-depth appraisals and between qualitative and quantitative methods is warranted. Regarding policy, we found that most reported causes and problems are modifiable, yet HCWs see them as not being implemented. If put in place earlier, preventative mental health strategies may help ameliorate the acute mental health impact and its mid-and long-term effects on HCWs and health systems in the future. Our findings suggest that such strategies could be set up at all levels, from intrapersonal to public health. At the individual level, self-help strategies are already being used and might help with various mental health problems. At the interpersonal level, informal peer support is seen by most HCWs as very useful for overcoming difficult working conditions. At the organization level, our informants call for actions that promote collaborative work, allow reassignments when needed, build strong leadership, or promote a (mentally) healthy working environment. At the community level, anti-stigma campaigns might be good to reduce the sense of loneliness and exhaustion frequently reported after the initial pandemic outbreak. Last, at the public policy level, offering specific mental health support and improving working conditions might also help with several mental health problems. In terms of practice, our findings may help design, adapt, and implement transdiagnostic mental health programs tailored for HCWs that can be rapidly implemented and scaled up from the early moments of future health crises. Notably, such programs might rely on already available resources, such as peer support or self-help, always following the restrictive measures to contain epidemics. In Spain, therefore, the RESPOND consortium will explore the effectiveness of a stepped-care program of scalable, internet-based psychological interventions locally adapted for HCWs working in an early pandemic hotspot.

Data availability statement

The datasets presented in this article are not readily available because the qualitative data is not anonymized and, therefore,

can not be shared. Requests to access the datasets should be directed to KM, kerry.rodriguez@uam.es.

Ethics statement

The studies involving human participants were reviewed and approved by Hospital La Paz in Madrid (study ID: 4498) and Parc Sanitari Sant Joan de Déu in Barcelona (study ID: PIC-277-20). The patients/participants provided their written informed consent to participate in this study.

The RESPOND consortium

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Funding

The RESPOND project was funded under Horizon 2020—the Framework Programme for Research and Innovation (2014–2020) (grant number: 101016127) and the work of MF-N was supported by a postdoctoral fellowship of the ISCIII (CD20/00036).

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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References

1. Aymerich C, Pedruzo B, Pérez JL, Laborda M, Herrero J, Blanco J, et al. COVID-19 pandemic effects on health worker's mental health: Systematic review and meta-analysis. *Eur Psychiatry*. (2022) 65:e10. doi: 10.1192/j.eurpsy.2022.1
2. Johns G, Samuel V, Freemantle L, Lewis J, Waddington L. The global prevalence of depression and anxiety among doctors during the covid-19 pandemic: Systematic review and meta-analysis. *J Affect Disord*. (2022) 298:431–41. doi: 10.1016/j.jad.2021.11.026
3. Pappa S, Ntella V, Giannakoulis T, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav Immun*. (2020) 88:901–7. doi: 10.1016/j.bbi.2020.05.026
4. Alimoradi Z, Ohayon MM, Griffiths MD, Lin CY, Pakpour AH. Fear of COVID-19 and its association with mental health-related factors: systematic review and meta-analysis. *BJ Psych Open*. (2022) 8:26. doi: 10.1192/bjo.2022.26
5. Alimoradi Z, Broström A, Tsang HWH, Griffiths MD, Haghayegh S, Ohayon MM, et al. Sleep problems during COVID-19 pandemic and its' association to psychological distress: a systematic review and meta-analysis. *EClinicalMedicine*. (2021) 36:100916. doi: 10.1016/j.eclinm.2021.100916
6. World Health Organization. *Mental Health and COVID-19: Early Evidence of the Pandemic's Impact*. Geneva: World Health Organization (2022)
7. Alonso J, Vilagut G, Alayo I, Ferrer M, Amigo F, Aragón-Peña A, et al. Mental impact of Covid-19 among Spanish healthcare workers. A large longitudinal survey. *Epidemiol Psychiatr Sci*. (2022) 31:e28. doi: 10.1017/S2045796022000130
8. Canal-Rivero M, Armesto-Luque L, Rubio-García A, Rodríguez-Menéndez G, Garrido-Torres N, Capitán L, et al. Trauma and stressor-related disorders among health care workers during COVID-19 pandemic and the role of the gender: a prospective longitudinal survey. *J Affect Disord*. (2022) 302:110–22. doi: 10.1016/j.jad.2022.01.021
9. Mediavilla R, Fernandez-Jimenez E, Martinez-Morata I, Jaramillo F, Andreo-Jover J, Moran-Sanchez I, et al. *Sustained Negative Mental Health Outcomes Among Healthcare Workers Over the First Year of the COVID-19 Pandemic: A Prospective Cohort Study*. (2021). Available online at: <https://www.medrxiv.org/content/10.1101/2021.11.21.21266594v1> (accessed 26 de noviembre de 2021)
10. Sasaki N, Asaoka H, Kuroda R, Tsuno K, Imamura K, Kawakami N. Sustained poor mental health among healthcare workers in COVID-19 pandemic: a longitudinal analysis of the four-wave panel survey over 8 months in Japan. *J Occup Health*. (2021) 63:e12227. doi: 10.1002/1348-9585.12227
11. Borek AJ, Pilbeam C, Mableson H, Wanat M, Atkinson P, Sheard S, et al. Experiences and concerns of health workers throughout the first year of the COVID-19 pandemic in the UK: a longitudinal qualitative interview study. *PLOS ONE*. (2022) 17:e0264906. doi: 10.1371/journal.pone.0264906
12. Ritchie H, Mathieu E, Rodés-Guirao L, Appel C, Giattino C, Ortiz-Ospina E, et al. Coronavirus Pandemic (COVID-19). Available online at: <https://ourworldindata.org/covid-cases>.
13. Schug C, Geiser F, Hiebel N, Beschoner P, Jerg-Bretzke L, Albus C, et al. Sick leave and intention to quit the job among nursing staff in German hospitals during the COVID-19 pandemic. *Int J Environ Res Public Health*. (2022) 19:1947. doi: 10.3390/ijerph19041947
14. Stefanovska - Petkovska M, Stefanovska VV, Bojadjeva S, Bojadjev MI. Psychological distress, burnout, job satisfaction and intention to quit among primary healthcare nurses. *Health Serv Manage Res*. (2021) 34:92–8. doi: 10.1177/0951484820971444
15. De los Santos JAA, Labrague LJ. The impact of fear of COVID-19 on job stress, and turnover intentions of frontline nurses in the community: a cross-sectional study in the Philippines. *Traumatology*. (2021) 27:52–9. doi: 10.1037/trm0000294
16. Instituto de Salud Carlos III. *Vigilancia de los excesos de mortalidad por todas las causas*. Madrid: Instituto de Salud Carlos III (2020)

Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2022.956403/full#supplementary-material>

17. Instituto de Salud Carlos III. Informe nº 19. *Situación de COVID-19*. Madrid: Instituto de Salud Carlos III (2020).
18. Instituto de Salud Carlos III. *COVID-19*. Madrid: Instituto de Salud Carlos III (2020).
19. Martínez-Alés G, Domingo-Relloso A, Arribas JR, Quintana-Díaz M, Hernán MA. the COVID@HULP Group. Critical care requirements under uncontrolled transmission of SARS-CoV-2. *Am J Public Health*. (2021) 111:923–6. doi: 10.2105/AJPH.2020.306151
20. World Health Organization, International Labour Organization. *Caring for Those who Care: National Programmes for Occupational Health for Health Workers*. Policy brief. Geneva: World Health Organization (2020).
21. Alonso J, Vilagut G, Mortier P, Ferrer M, Alayo I, Aragón-Peña A, et al. Mental health impact of the first wave of COVID-19 pandemic on Spanish healthcare workers: a large cross-sectional survey. *Revista de Psiquiatría y Salud Mental*. (2021) 14:90–105. doi: 10.1016/j.rpsm.2020.12.001
22. Kunzler AM, Röthke N, Günthner L, Stoffers-Winterling J, Tüscher O, Coenen M, et al. Mental burden and its risk and protective factors during the early phase of the SARS-CoV-2 pandemic: systematic review and meta-analyses. *Global Health* 29. (2021) 17:34. doi: 10.1186/s12992-021-00670-y
23. Lasalvia A, Bonetto C, Porru S, Carta A, Tardivo S, Bovo C, et al. Psychological impact of COVID-19 pandemic on healthcare workers in a highly burdened area of north-east Italy. *Epidemiol Psychiatr Sci*. (2021) 17:e1. doi: 10.1017/S2045796020001158
24. Mediavilla R, Fernández-Jiménez E, Martínez-Alés G, Moreno-Küstner B, Martínez-Morata I, Jaramillo F, et al. Role of access to personal protective equipment, treatment prioritization decisions, and changes in job functions on health workers' mental health outcomes during the initial outbreak of the COVID-19 pandemic. *J Affect Disord*. (2021) 295:405–9. doi: 10.1016/j.jad.2021.08.059
25. Morawa E, Schug C, Geiser F, Beschoner P, Jerg-Bretzke L, Albus C, et al. Psychosocial burden and working conditions during the COVID-19 pandemic in Germany: the VOICE survey among 3678 health care workers in hospitals. *J Psychosom Res*. (2021) 144:110415. doi: 10.1016/j.jpsychores.2021.110415
26. Olashore AA, Akanni OO, Fela-Thomas AL, Khutsafalo K. The psychological impact of COVID-19 on health-care workers in African Countries: a systematic review. *Asian J Soc Health Behav*. (2021) 4:85. doi: 10.4103/shb.shb_32_21
27. Priede A, López-Álvarez I, Carracedo-Sanchidrián D, González-Blanch C. Mental health interventions for healthcare workers during the first wave of COVID-19 pandemic in Spain. *Rev Psiquiatr Salud Ment (Engl Ed)*. (2021) 14:83–9. doi: 10.1016/j.rpsm.2021.01.005
28. Rodríguez-Vega B, Palao Á, Muñoz-Sanjose A, Torrijos M, Aguirre P, Fernández A, et al. Implementation of a mindfulness-based crisis intervention for frontline healthcare workers during the COVID-19 outbreak in a public general hospital in Madrid, Spain. *Front Psychiatry*. (2020) 11:562578. doi: 10.3389/fpsyt.2020.562578
29. Bai Y, Lin CC, Lin CY, Chen JY, Chue CM, Chou P. Survey of stress reactions among health care workers involved with the SARS outbreak. *PS*. (2004) 55:1055–7. doi: 10.1176/appi.ps.55.9.1055
30. Lee SM, Kang WS, Cho AR, Kim T, Park JK. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. *Compr Psychiatry*. (2018) 87:123–7. doi: 10.1016/j.comppsy.2018.10.003
31. Wilder-Smith A, Chiew CJ, Lee VJ. Can we contain the COVID-19 outbreak with the same measures as for SARS? *Lancet Infect Dis*. (2020) 20:e102–7. doi: 10.1016/S1473-3099(20)30129-8
32. Telenti A, Arvin A, Corey L, Corti D, Diamond MS, García-Sastre A, et al. After the pandemic: perspectives on the future trajectory of COVID-19. *Nature*. (2021) 596:495–504. doi: 10.1038/s41586-021-03792-w
33. Salazar de Pablo G, Vaquerizo-Serrano J, Catalan A, Arango C, Moreno C, Ferré F, et al. Impact of coronavirus syndromes on physical and mental health of

health care workers: systematic review and meta-analysis. *J Affect Disord.* (2020) 275:48–57. doi: 10.1016/j.jad.2020.06.022

34. Palinkas LA. Qualitative and mixed methods in mental health services and implementation research. *J Clin Child Adolesc Psychol.* (2014) 43:851–61. doi: 10.1080/15374416.2014.910791

35. Ayuso-Mateos JL, Miret M, Lopez-Garcia P, Alem A, Chisholm D, Gureje O, et al. Effective methods for knowledge transfer to strengthen mental health systems in low- and middle-income countries. *BJ Psych Open.* (2019) 5:50. doi: 10.1192/bjo.2019.50

36. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, et al. Process evaluation of complex interventions: medical research council guidance. *BMJ.* (2015) 350:h1258. doi: 10.1136/bmj.h1258

37. Brownson RC, Fielding JE, Maylahn CM. Evidence-Based public health: a fundamental concept for public health practice. *Annu Rev Public Health.* (2009) 30:175–201. doi: 10.1146/annurev.publhealth.031308.100134

38. Applied Mental Health Research Group. *Design, Implementation, Monitoring, and Evaluation of mental health and psychosocial assistance programs for trauma survivors in low resource countries: A user's manual for researchers and program implementers (adult version).* Baltimore, USA: John Hopkins University (2013). p. 66

39. Annells M. Grounded theory method: philosophical perspectives, paradigm of inquiry, and postmodernism. *Qual Health Res.* (1996) 6:379–93. doi: 10.1177/104973239600600306

40. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* (2006) 3:77–101. doi: 10.1191/1478088706qp063oa

41. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Educ Q.* (1988) 15:351–77. doi: 10.1177/109019818801500401

42. Wallace JE. Mental health and stigma in the medical profession. *Health (London).* (2012) 16:3–18. doi: 10.1177/1363459310371080

43. Hennein R, Lowe S. A hybrid inductive-abductive analysis of health workers' experiences and wellbeing during the COVID-19 pandemic in the United States. *PLoS ONE.* (2020) 15:e0240646. doi: 10.1371/journal.pone.0240646

44. Brown FL, Aoun M, Taha K, Steen F, Hansen P, Bird M, et al. The cultural and contextual adaptation process of an intervention to reduce psychological distress in young adolescents living in Lebanon. *Front Psychiatry.* (2020) 11:212. doi: 10.3389/fpsy.2020.00212

45. Burchert S, Alkneime MS, Bird M, Carswell K, Cuijpers P, Hansen P, et al. User-Centered app adaptation of a low-intensity e-mental health intervention for Syrian refugees. *Front Psychiatry.* (2019) 9:663. doi: 10.3389/fpsy.2018.00663

46. Chiumento A, Rutayisire T, Sarabwe E, Hasan MT, Kasujja R, Nabirinde R, et al. Exploring the mental health and psychosocial problems of Congolese refugees living in refugee settings in Rwanda and Uganda: a rapid qualitative study. *Confl Health.* (2020) 14:77. doi: 10.1186/s13031-020-00323-8

47. López Steinmetz LC, Herrera CR, Fong SB, Godoy JC. A Longitudinal study on the changes in mental health of healthcare workers during the COVID-19 pandemic. *Psychiatry.* (2021) 85:56–71. doi: 10.1080/00332747.2021.1940469

48. Pinho L, Correia T, Sampaio F, Sequeira C, Teixeira L, Lopes M, et al. The use of mental health promotion strategies by nurses to reduce anxiety, stress, and depression during the COVID-19 outbreak: a prospective cohort study. *Environ Res.* (2021) 195:110828. doi: 10.1016/j.envres.2021.110828

49. Organización Colegial de Enfermería. *Radiografía de la situación profesional y emocional de la profesión enfermera.* Madrid: CGE (2022). p. 41.

50. Schwartz S, Susser E, Susser M, A. Future for epidemiology? *Annu Rev Public Health.* (1999) 20:15–33. doi: 10.1146/annurev.publhealth.20.1.15

51. Lazarus RS, Folkman S. *Stress, Appraisal, and Coping.* Springer Publishing Company (1984). p. 460.

52. Lazarus RS, Folkman S. Transactional theory and research on emotions and coping. *Eur J Pers.* (1987) 1:141–69. doi: 10.1002/per.2410010304

53. Magnavita N, Soave PM, Antonelli M. Prolonged stress causes depression in frontline workers facing the COVID-19 pandemic—a repeated cross-sectional study in a covid-19 hub-hospital in central Italy. *Int J Environ Res Public Health.* (2021) 18:7316. doi: 10.3390/ijerph18147316

54. Ortiz-Calvo E, Martínez-Alés G, Mediavilla R, González-Gómez E, Fernández-Jiménez E, Bravo-Ortiz MF, et al. The role of social

support and resilience in the mental health impact of the COVID-19 pandemic among healthcare workers in Spain. *J Psychiatr Res.* (2021) 148:181–7. doi: 10.1016/j.jpsychires.2021.12.030

55. Thoresen S, Jensen TK, Wentzel-Larsen T, Dyb G. Social support barriers and mental health in terrorist attack survivors. *J Affect Disord.* (2014) 156:187–93. doi: 10.1016/j.jad.2013.12.014

56. Devi S. COVID-19 exacerbates violence against health workers. *Lancet.* (2020) 396:658. doi: 10.1016/S0140-6736(20)31858-4

57. Taylor S, Landry CA, Rachor GS, Paluszek MM, Asmundson GJG. Fear and avoidance of healthcare workers: an important, under-recognized form of stigmatization during the COVID-19 pandemic. *J Anxiety Disord.* (2020) 75:102289. doi: 10.1016/j.janxdis.2020.102289

58. McKay D, Heisler M, Mishori R, Catton H, Kloiber O. Attacks against health-care personnel must stop, especially as the world fights COVID-19. *Lancet.* (2020) 395:1743–5. doi: 10.1016/S0140-6736(20)31191-0

59. Patel BR, Khanpara BG, Mehta PI, Patel KD, Marvania NP. Evaluation of perceived social stigma and burnout, among health-care workers working in covid-19 designated hospital of India: a cross-sectional study. *Asian J Soc Health Behav.* (2021) 4:156. doi: 10.4103/shb.shb_54_21

60. Elhadi M, Msherghi A, Elgzairi M, Alhashimi A, Bouhuwaish A, Biala M, et al. Psychological status of healthcare workers during the civil war and COVID-19 pandemic: a cross-sectional study. *J Psychosom Res.* (2020) 137:110221. doi: 10.1016/j.jpsychores.2020.110221

61. Mediavilla R, Fernández-Jiménez E, Andreo J, Morán-Sánchez I, Muñoz-Sanjosé A, Moreno-Küstner B, et al. *Association Between Perceived Discrimination and Mental Health Outcomes Among Health Workers During the Initial COVID-19 outbreak.* Available online at: <https://www.sciencedirect.com/science/article/pii/S1888989121000628> (accessed July 04, 2022).

62. Ramaci T, Barattucci M, Ledda C, Rapisarda V. Social Stigma during COVID-19 and its Impact on HCWs Outcomes. *Sustainability.* (2020) 12:3834. doi: 10.3390/su12093834

63. Santabárbara J, Bueno-Notivol J, Lipnicki DM, Olaya B, Pérez-Moreno M, Gracia-García P, et al. Prevalence of anxiety in health care professionals during the COVID-19 pandemic: a rapid systematic review (on published articles in Medline) with meta-analysis. *Prog Neuropsychopharmacol Biol Psychiatry.* (2021) 107:110244. doi: 10.1016/j.pnpbp.2021.110244

64. Lee C, Nguyen AJ, Russell T, Aules Y, Bolton P. Mental health and psychosocial problems among conflict-affected children in Kachin State, Myanmar: a qualitative study. *Confl Health.* (2018) 12:39. doi: 10.1186/s13031-018-0175-8

65. Rahman A, Khan MN, Hamdani SU, Chiumento A, Akhtar P, Nazir H, et al. Effectiveness of a brief group psychological intervention for women in a post-conflict setting in Pakistan: a single-blind, cluster, randomised controlled trial. *Lancet.* (2019) 393:1733–44. doi: 10.1016/S0140-6736(18)32343-2

66. Tol WA, Leku MR, Lakin DP, Carswell K, Augustinavicius J, Adaku A, et al. Guided self-help to reduce psychological distress in South Sudanese female refugees in Uganda: a cluster randomised trial. *The Lancet Global Health.* (2020) 8:e254–63. doi: 10.1016/S2214-109X(19)30504-2

67. Bryant RA, Dawson KS, Keyan D, Azevedo S, Yadav S, Tran J, et al. Effectiveness of a Videoconferencing-Delivered Psychological Intervention for Mental Health Problems during COVID-19: A Proof-of-Concept Randomized Clinical Trial. *Psychother Psychosom.* (2021) 7:1–10. doi: 10.1159/000520283

68. Riello M, Purgato M, Bove C, Tedeschi F, MacTaggart D, Barbui C, et al. Effectiveness of self-help plus (SH+) in reducing anxiety and post-traumatic symptomatology among care home workers during the COVID-19 pandemic: a randomized controlled trial. *R Soc Open Sci.* (2021) 8:210219. doi: 10.1098/rsos.210219

69. Mediavilla R, Fernández-Jiménez E, Rodríguez-Vega B, Gotor-Martínez L, Rivelles-Sevilla RV, Rojano-Capilla P, et al. Adapting mental health care after the COVID-19 outbreak: preliminary findings from a public general hospital in Madrid (Spain). *Psychiatr Res.* (2020) 12:113077. doi: 10.1016/j.psychres.2020.113077

70. Shrestha N, Shad MY, Ulvi O, Khan MH, Karamelic-Muratovic A, Nguyen USDT, et al. The impact of COVID-19 on globalization. *One Health.* (2020) 11:100180. doi: 10.1016/j.onehlt.2020.100180

71. Barber RM, Fullman N, Sorensen RJD, Bollyky T, McKee M, Nolte E, et al. Healthcare Access and Quality Index based on mortality from causes amenable to personal health care in 195 countries and territories, 1990–2015: a novel analysis from the global burden of disease study 2015. *Lancet.* (2017) 15:390. doi: 10.1016/S0140-6736(17)30818-8



OPEN ACCESS

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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

RECEIVED 18 May 2022

ACCEPTED 03 August 2022

PUBLISHED 19 August 2022

CITATION

El Sharif N, Ahmead M and Imam A
(2022) COVID-19 infection prevention
and control procedures and
institutional trust: Perceptions of
Palestinian healthcare workers.
Front. Public Health 10:947593.
doi: 10.3389/fpubh.2022.947593

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COVID-19 infection prevention and control procedures and institutional trust: Perceptions of Palestinian healthcare workers

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Background: Lack of trust in institutional control measures during Coronavirus disease 2019 (COVID-19) outbreaks may affect healthcare workers' (HCWs) levels of stress and wellbeing, and as a consequence, may influence their trust and confidence in their organization. This study aims to understand factors associated with healthcare workers perceptions of trust in organizational preparedness, communication, and infection risk during the COVID-19 pandemic.

Methods: A cross-sectional study was conducted among HCWs ($n = 876$) in 16 COVID 19 healthcare facilities between October and December 2020 in Palestine (Gaza Strip, West Bank and East Jerusalem). A stratified purposive sample using an online self-administered Arabic version of a questionnaire was used for data collection. The questionnaire used for this study was adapted from the World Health Organization Blueprint Novel Coronavirus Perceptions of healthcare workers regarding local infection prevention and control procedures for a COVID-19 research protocol.

Data were analyzed using Statistical Package for Social Sciences software version 23. In the bivariate analysis, T -test, one-way ANOVA and χ^2 test were used at a significant p -value < 0.05 . In the multivariable logistic regression analyses, the adjusted odds ratios and its 95% confidence intervals are presented.

Results: Findings showed that confidence in the systems' ability to manage COVID-19 cases, encouragement and support from senior medical/nursing staff to apply recommended IPC measures, and good levels of mental health increased trust in the organization. Additionally, receiving proper training on IPC procedures for other communicable diseases, having access to clear policies and procedures related to IPC procedures for COVID-19, and providing PPE during the previous clinical shift also increased trust. However, the intention to use recommended PPE when treating patients with suspected or confirmed COVID-19 when having access to it and feeling emotional was negatively correlated with this trust.

Conclusions: HCWs should be provided with clear, accessible communications about policies and protocols, as well as training about infection prevention and control, personal protective equipment, and support

during pandemics to increase their trust in the healthcare system. Additionally, the improvement in HCWs' wellbeing can be attributed to a greater sense of trust in institutions.

KEYWORDS

perception, healthcare workers, institutional trust, COVID-19, Palestine

Background

The Coronavirus disease 2019 (COVID-19) pandemic has posed exceptional challenges and threats to healthcare systems globally with millions of confirmed cases and deaths (1). The pandemic has had a major impact on the capacity of health systems to continue the delivery of essential health services and has put intense pressure on healthcare workers (HCWs) and resources (2). Frontline HCWs are at a higher risk of infection and death due to their direct contact with COVID-19 patients; the pandemic has caused the deaths of more healthcare workers than any other disease outbreak (3), in addition to the effect on their physical and mental health (4).

The literature underscores the importance of healthcare workers' trust and psychological safety as pre-requisites for organizational resilience in healthcare organizations (5–7). Resilience depends on several factors such as planning, perception, organizational trust and reaction to unexpected conditions such as a pandemic (8). The COVID-19 pandemic highlights the importance of organizational trust for healthcare workers to make tradeoffs, communicate safety concerns to managers and improve organizational resilience. The absence of leadership support for HCWs during the COVID-19 pandemic was suggested as a factor in emotional distress and burnout (6). Ultimately, lack of support may undermine the trust needed for healthcare workers to communicate patient safety concerns to their managers (7). In addition, lack of confidence and trust in institutional control measures during COVID-19 outbreaks may have an impact on HCWs levels of stress and subjective wellbeing, including cognitive and emotional dimensions such as anxiety, worry, fear, sadness and tearfulness (2). This may influence HCWs perceptions and confidence in carrying out and adhering to infection prevention and control (IPC) procedures (4, 9–12), and could increase their risk of becoming infected (13). Thus, lack of trust has a substantial effect on the physical

and mental health of HCWs, and the quality of care delivered to patients within clinical settings (12, 14).

Previous studies showed poor compliance of healthcare workers with infection prevention and control (IPC) measures in practice (15, 16), which are crucial to preventing the spread of infection caused by COVID-19 (15). Therefore, HCWs should apply appropriate IPC behaviors including personal protective equipment (PPE) use and hand hygiene, to protect patients and themselves from infection (14–16). In China, Wuhan (2021), HCWs reported good IPC behaviors, while the compliance with goggle and gown use was relatively low (below 85%). In terms of hand hygiene and droplet isolation behaviors, environmental context and resources domain were significantly correlated. Environmental context, knowledge domain and emotion domain were all significantly related to goggle and gown use. Overall droplet isolation behaviors and gown use were also predicted by social influences (17).

In the COVID-19 pandemic, personal protective equipment (PPE) usage and trust in institutions' differing recommendations and requirements have become major concerns. Protection for HCWs by providing personal protective equipment (PPE), training, addressing fatigue, and treating the psychosocial consequences of the outbreak are seen as a crucial task of health organizations globally and are measures linked to institutional trust (18–21). Therefore, the health organization must ensure the provision of medical supplies based on need, type, quality and quantity, in addition to appropriate psychological support, interventions and staff support measures.

Limited number of studies was done on trusting organization during COVID-19. A study in Nigeria showed that a significant relationship between trust in the health facility and the provision of clear accessible policies and protocols regarding IPC, personal protective equipment and support (22). Another study in Canada showed that nurses without experience working in outbreak settings had higher levels of fear of becoming ill and fear of providing care for COVID-19 patients compared to the experienced nurses who had better Infection Prevention and Control (IPC) skills and easier access to personal protective equipment (23). In a study, health workers in India reported physical fatigue, dehydration, weight loss, suffocation, rash eruptions, and exhaustion due to increased work hours and the use of personal protective equipment kits. In addition, due to their fear of infection and their increased workload, HCWs

Abbreviations: CI, confidence intervals; COVID-19, coronavirus disease 2019; HCWs, healthcare workers; IPC, infection prevention and control; MERS, middle east respiratory syndrome; MOH, ministry of health; PPE, personal protective equipment; OR, odds ratio; TDF, theoretical domains framework; UNOCHA, coordination of humanitarian affairs; WHO, world health organization.

reported being socially isolated from friends and family (24). A local Palestinian study showed that fear of COVID-19 was positively correlated with depression, anxiety and stress among psychosocial service providers. In addition, fear of COVID-19 and psychological distress was fully mediated by wellbeing (25).

In the Occupied Palestinian Territories, as in other lower-middle income countries dealing with conflict (26), the resources available to deal with COVID-19 were (and are still) scarce and there was no emergency plan to deal with such a scenario. District emergency committees were activated across all governorates in preparedness, and training targeted medical and non-medical personnel working in primary, secondary and emergency health services. Therefore, this study aims to understand factors associated with healthcare workers perceptions of trust in organizational preparedness, communication, and infection risk during the COVID-19 pandemic.

Materials and methods

Study design

A descriptive cross-sectional survey was conducted among healthcare workers during the period of October to December 2020.

Study settings and sampling

The study was implemented in the West Bank, Gaza Strip, and East Jerusalem. The Palestinian Authority and the authority in the Gaza Strip assume responsibilities for administration of public health-care provision to the Palestinian population. The Palestinian health care system faces barriers in the form of permit restrictions that limit Palestinian access to health care. Restrictions on access and movement are common in Palestine, and they make access to health care incredibly difficult. In addition, in East Jerusalem, six Palestinian hospitals are the main providers of tertiary referral care for Palestinians in the West Bank and Gaza Strip for health services of which the Ministry of Health is unable to provide. But Palestinians are often denied permits to travel there, even to receive desperately needed medical care (27).

The study was carried out in healthcare facilities: i.e., hospitals (governmental, non-governmental and private hospitals) with COVID-19 care units and COVID-19 healthcare centers. Healthcare professionals who were providing clinical care to patients were invited to participate in this study. The sample included medical doctors (specialized, residents, general physicians), nurses and nursing assistants, and allied health professionals (laboratory technicians, radiology technicians). A stratified purposive sample with probability proportional to size

was used to select the healthcare facility and study participants. We selected the main governmental hospital, a private hospital with a COVID-19 care unit, and a COVID-19 healthcare center in each of the three study locations (i.e., Gaza Strip, the West Bank, and East Jerusalem). As a result, sixteen hospitals and medical centers were included in the study, out of a total of sixty.

Data collection tool

This study questionnaire was a translated Arabic version by the study based on the data collection tool developed by the World Health Organization (WHO) in the protocol under the COVID-19 Research Roadmap (28). This study questionnaire was first translated into Arabic by the research team, and then back into English by a trained medical translator. Before piloting the questionnaire, the original English questionnaire and the back translated version were checked to ensure that the translation was accurate.

The study protocol was developed by experts in the Social Science and IPC Working Group who identified a pool of items based on WHO IPC interim guidance published in March 2020 (29, 30). We used a previous framework for studying clinician behavior, the Theoretical Domains Framework (TDF), in this study (30, 31). The TDF can promote the understanding of HCWs' behaviors, such as IPC practice, by examining potential underlying factors. It provides a framework that captures core constructs from multiple behavioral theories into 14 domains (32). Questions for this survey addressed the following TDF domains: knowledge; skills; social/professional role and identity; beliefs about capabilities; beliefs about consequences; environmental context and resources; and intentions, social influences, and emotions. Additional items in the survey, not included in the TDF framework, assessed three dimensions of institutional trust and were based on a previously validated measure (33). Therefore, TDF was applied in this study to identify determinants of HCWs' IPC behaviors during the COVID-19 pandemic to develop targeted strategies for optimizing such behaviors at this critical time (31–33).

To assess trust in health facilities and government, the survey tool included validated questions on HCWs responses regarding their trust in the institution where they worked and comprised the three different dimensions of institutional trust: perceptions of competence, honesty, and actions that are in the employees' best interests (3). The three trust measures questions were: the health facility where I work is ready to manage COVID-19; the health facility where I work is being honest with staff when managing COVID-19; and the health facility where I work would act in the interest of its staff when managing COVID-19. The six-point scale used was: "all of the time;" "most of the time;" "more than half of the time;" "less than half of the time;" "some of the time;" "at no time." The trust score internal consistency coefficient was 0.76 (Cronbach's α).

In addition, the following TDF domains items were used to further interpret the data- on seven-point Likert scale-: emotions, service demand, environmental context and resources, skills and intentions, beliefs about capabilities and consequences, social influences/professional role, and wellbeing.

The Emotions item score was based on responses to questions regarding perceived personal risk and fear on the job (i.e., I am concerned about the risk to myself of becoming ill with COVID-19; I am concerned about the risk to my family related to COVID-19 as a result of my job role; I am afraid of looking after patients who are ill with COVID-19) (Cronbach's α : 0.68). The Service Demand item score reflected perceptions of whether the health system can handle current and future patient demands (i.e., I am confident that the healthcare service where I work can manage current patient demand related to COVID-19 and I am confident that the healthcare service where I work can continue to manage patient demand related to COVID-19 over the next 3 months) (Cronbach's α : 0.80). The Environment item reflected the clarity of reporting measures of exposures, guidance materials, and ease of access to infection control practices (Cronbach's α : 0.67). The Skills and Intentions combined items score reflected training, confidence, and use of PPE (Cronbach's α : 0.82). The Beliefs item score was calculated from answers regarding their beliefs in the effectiveness of PPE and IPC procedures, and the amount of strain these procedures create (Cronbach's α : 0.84). The ability and motivation of HCWs to follow IPC precautions (28), and the social support of the community and medical staff, were also assessed (34). The WHO-5 wellbeing item scale—a validated and generic global rating scale to measure subjective wellbeing during the previous 2 weeks—was also included and staff emotions throughout the pandemic were investigated (35–37) (Cronbach's α : 0.86). The seven-point Likert scale ranged from “strongly disagree,” “Disagree,” “Somewhat disagree,” “Neither agree nor disagree,” “Somewhat agree,” “Agree,” and “strongly agree.” However, item questions related to PPE use and knowledge of recommended infection prevention and control procedures when providing direct medical care to suspected or confirmed COVID-19 cases included “Yes” and “No” answers only.

Information was collected on participants' characteristics (age, gender, marital status, having children or older adults at home), role and experience at work, their experience of caring for patients with suspected or confirmed COVID-19 infection, and their exposure to COVID-19. The translated Arabic version was piloted before its use to test for language clarity.

Data collection

An online self-administered survey method was used for data collection. An electronic version of the questionnaire was sent to the selected participants. The United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) data

collection for humanitarian use software “Kobo Toolbox” was used for data collection (38). Field coordinators contacted the targeted healthcare facility, obtained the full list of participants (email or WhatsApp) from the personnel departments for all HCWs. The questionnaire was then sent to all employees working in the targeted healthcare facility.

Data analysis

For descriptive analysis, demographic characteristics are presented as frequencies and mean and standard deviation (mean \pm SD) depending on variable types. For the variables whose answers were using the 7-point Likert scale, most of the variables were re-categorized into a 5-point Likert scale due to the small difference between “strongly agree” and “agree” answers, “somewhat agree” and between “strongly disagree,” “somewhat disagree” and “disagree” answers. Since the data shows very low frequencies in the answers of “strongly disagree,” and “disagree,” and low frequency for the answers of “strongly agree,” and “agree,” we summed the scale into 5-point Likert scales (Supplementary Figure 1). However, again we re-categorize the 5-Likert points into a 3-point scale due to low frequencies to have significant results in the analysis.

For HCWs' emotional wellbeing, i.e., the five WHO-5 statements, the participants' responses were summarized into a total raw score and multiplied by 4 to produce an individual total score from 0 to 100, with the higher end of the scale representing the best possible wellbeing (35). The mean and standard deviation for the WHO-5 score was calculated. The emotions index was the sum of three questions.

The trust index was the sum of the three questions. The mean, median, and standard deviation were calculated. The median was used as a cutoff point (50%) since it is equivalent for a total score index of less than half of the time total trust.

The bivariate analysis took place of the WHO-5 score that comprised data on gender, marital status, place of residence, job role, medical specialty, place of work during COVID-19 outbreak, type of organization, working in more than one place, daily contact with patients, monthly income, and HCWs contact with a suspected/confirmed COVID-19 case. A *T*-test and one-way ANOVA *p*-value were calculated: a two-tailed *P*-value < 0.05 is considered statistically significant. The mean and standard deviation (SD) of trust variables were calculated to analyze the level of trust in a healthcare facility. For further analysis, we used a cutoff point of 50%. A χ^2 test was used for comparisons of the various variables with a trust score cutoff point of -50% .

Further multivariable regression analyses were performed to explore independent associations between different domains of the TDF and behavioral/social factors while adjusting for confounding factors. Binary logistic regression model, forward stepwise (Wald) method, was used for controlling for

TABLE 1 Characteristics of study population.

Age	Mean (\pm SD)	32 (\pm 7.79) years	
		Count (N)	N %
Gender	Female	301	34.4%
	Male	574	65.6%
	Total	875	
Place of work during COVID19 outbreak	West Bank	612	69.9
	Jerusalem	91	10.4
	Gaza Strip	173	19.7
	Total	876	
Ever diagnosed with COVID-19	Yes	207	23.6%
	No	669	76.4%
	Total	876	
Ever been tested for COVID-19?	Yes	704	80.8%
	No	167	19.8%
	Total	871	
Job role [†]	Senior nurse	448	51.1%
	Assistant nurse	59	6.7%
	Specialized doctor	79	9.0%
	Resident doctor	195	22.3%
	Allied health profession	80	9.1%
	Others	14	1.6%
	Total	875	
Medical specialty ^{††}	Acute care	513	61.3%
	Internal medicine	80	9.6%
	Surgery	51	6.1%
	Pediatrics	34	4.0%
	Others	159	19.0%
	Total	837	
Type of organization	Governmental	572	65.4%
	Non- governmental	303	34.6%
	Total	875	
HCWs contact with a suspected/confirmed COVID-19 case	No	101	12.1%
	Yes	732	87.9%
	Total	833	

^{††} others: Laboratory, maternity departments, general clinics, neonate department,

[†] Acute care (anesthesiology, ER, ICU, infectious disease unit). SD: standard deviation.

participants age, gender, place of work, type of institution, job role, location of work, direct vs. indirect care for COVID-19 patients. All study predictive variables (i.e., emotions, service demand, environmental context and resources, skills and intentions, beliefs about capabilities and consequences, social influences/professional role, wellbeing, and most recent PPE use) were included in the model. All variables and outcomes were defined before final analyses. Adjusted odds ratio (aOR) and their 95% confidence interval (95% CI) are presented. All analyses were performed with Statistical Package for Social Sciences V.25.0.2 (SPSS, Chicago, Illinois, USA).

Ethical issues

Permission was obtained from the Palestinian Ministry of Health to conduct the study. Al Quds research ethics committee approved the study. The study was also evaluated by the ethical review committee at the WHO office and approved before study funding. Written information about the purpose of the survey and how the data will be used was provided at the beginning of the questionnaire. Individual informed consent for participation in this study was obtained electronically by acceptance to fill in the study questionnaire.

Results

Demographic characteristics

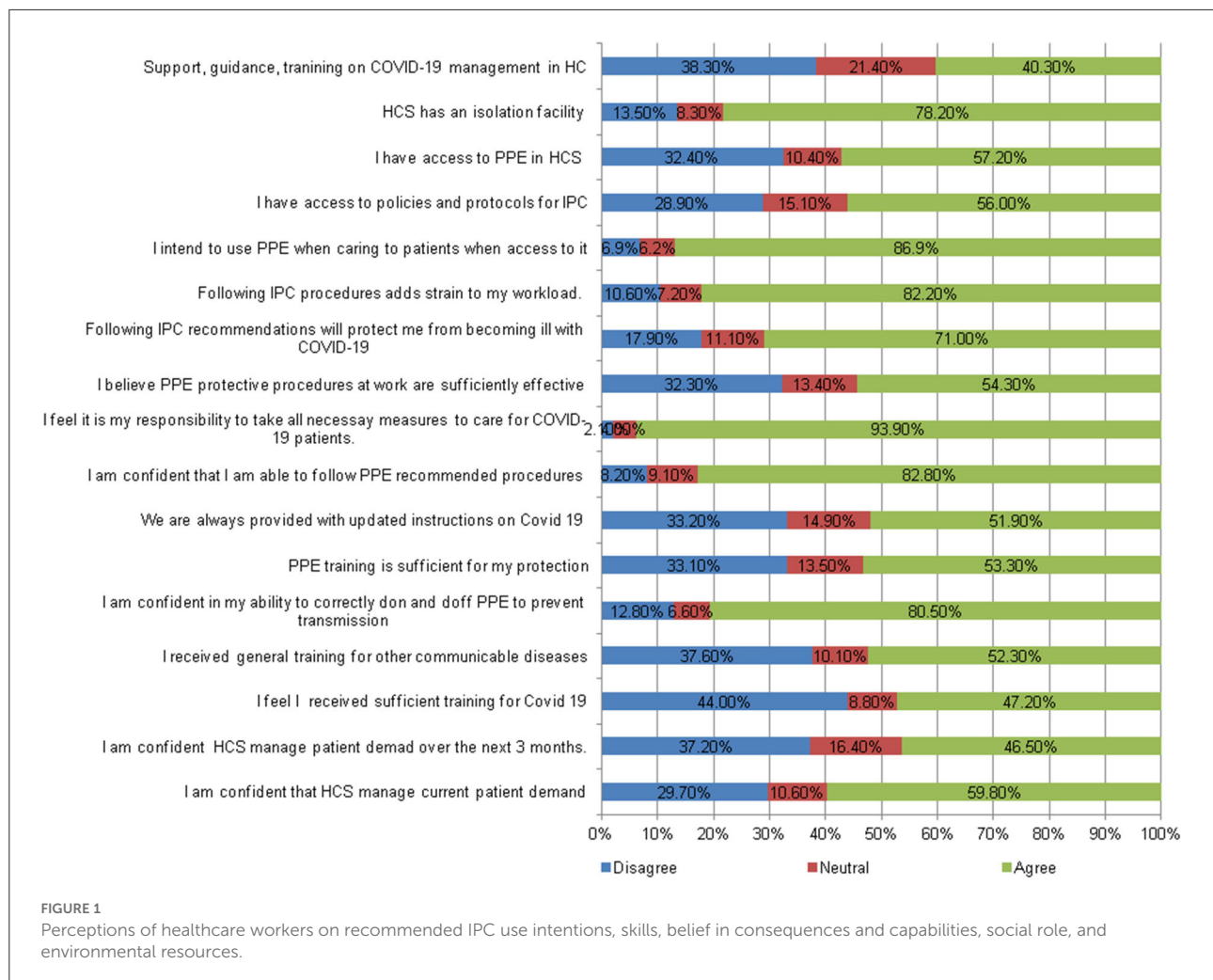
A total of 1,200 HCWs were approached and 876 participated in the study, with a response rate of 73%.

Table 1 shows that 65.6% of study participants were male, young and 70% of them were from the West Bank. About 65% were working in public healthcare facilities, half were senior nurses and 22% were resident physicians. Around 61% of the HCWs were working in the acute care units; 70% reported being in contact with a suspected/confirmed COVID-19 case, and 52% were in daily contact with COVID-19 patients. A 31% were caring for older adults (>70 years). Of the study participants, 24% reported being diagnosed with COVID-19 and 58% reported COVID-like symptoms. However, only 81% reported being tested for COVID-19.

Healthcare systems were forced to adapt to the pandemic. About 85% of healthcare facilities closed key departments and transformed them to offer COVID-19 care provision; 90% of the facilities targeted had dedicated sections. In addition, 50% of HCWs reported being transferred from their departments to COVID-19 departments.

Wellbeing of participants

In our study, the mean score of the WHO-5 wellbeing score was 35.96 (SD: 21.8) with a median of 36.0. Males showed significantly lower psychological wellbeing mean score values (34.8, SD 21.3) than females (38.2, SD 22.56) ($p < 0.05$), as did HCWs working with COVID-19 patients (34.5, SD 20.9) compared with those non-working with them (39.4, SD 23.3) ($p < 0.05$) (see [Supplementary Table 1](#)). Using a cutoff point of 50%, 76% of HCWs had poorer wellbeing during the COVID-19 pandemic. Finally, we conducted multivariable logistic regression to assess the influence of various participant characteristics on HCWs' wellbeing; none of these characteristics predicted the WHO-5 wellbeing cutoff point of 50%.



Healthcare workers emotions and sense of control during the pandemic

In our study, 51% of HCWs reported that getting infected with COVID-19 was out of their control, but 80% agreed that this risk was part of their job. Regarding concerns about exposure to COVID-19, while caring for patients, about half (45%) of HCWs reported fear, with 90% of them worried to transfer the infection to their families and 75% concerned to contract the illness themselves. In the multivariate ordinal logistic regression analysis to assess the influence of participants' characteristics on HCWs emotions and sense of control, none of the participants' characteristics predicted emotions or sense of control.

Protection, training, and PPE availability at work

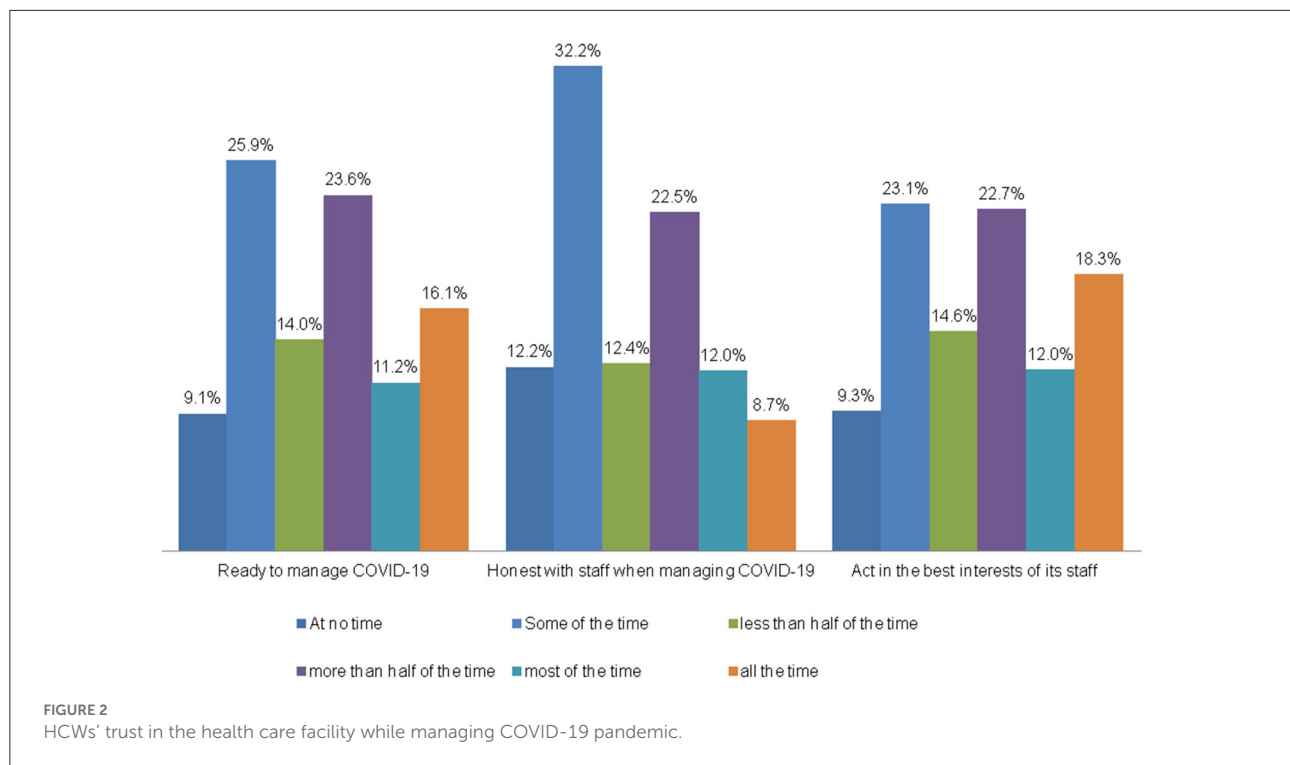
In our study, 78% of HCW reported that there was an isolation unit in their healthcare facility. However, only

40% reported receiving support, guidance, or training on COVID-19 management in the healthcare facility; 50% reported access to policies and protocols of prevention and control of COVID-19 (Figure 1).

On the availability and use of IPC, 87% reported their intention to use PPE when caring for patients, although 57% reported having access to PPE in their healthcare facility. Also, 52% reported being provided with updated instructions about COVID-19, and half reported receiving sufficient training on the use of PPE. Around 80% of HCWs reported confidence in their ability to use PPE properly to protect themselves and prevent transmission of infection, although 53% felt that they did not receive proper training in protection (Figure 1).

Health care workers reported that 41% of their sources of infection prevention information in the previous 2 weeks were social media, 24% were hospital training, 22% were official government websites, 2% were family and friends, and 11% came from other sources.

HCWs had a moderate belief level (50%) that it is their responsibility to take protective measures to protect themselves while caring for COVID-19 patients and 50% of them believed



that using PPE would protect them sufficiently from becoming infected at work. Also, 82% of HCWs believed that following the recommended procedures for the control of COVID-19 added a significant strain to their workload (Figure 1).

Trust in institution

In the study, HCWs were asked about their trust in the healthcare facility in managing COVID-19, being honest with staff, and acting in the best interests of staff. The mean trust score was 7.73 (standard deviation 3.86) and the median was 8.0 (range 0–15). During the pandemic, 50.9% of HCWs believed their organization could manage the healthcare facility (more than half of the time). Also, 43% trusted that their healthcare facility would be honest with staff (more than half of the time and more), and 53% trusted it can act in the best interests of staff (Figure 2). The mean of the three variables that represent participants' answers on institutional trust was 7.72 (SD 3.86) and the median was 8.0. This represents moderate trust by HCWs in their healthcare facility.

HCWs living in cities showed the highest mean in trust compared with participants living in other areas, and those working in East Jerusalem hospitals compared with workers in the West Bank and Gaza Strip ($p < 0.05$). Other variables did not indicate any significant difference. Using the cutoff point of 50%, 535 participants (49.7%) showed high trust in their organization. When comparing trust at the cutoff of 50%,

only the place of residence and type of organization showed a significant difference in p -value 0.05 (Table 2).

Multivariate analysis

In Table 3, the bivariate logistic regression model showed the factors that determine HCWs' institutional trust as reflected in the responses about whether HCWs believed that their health facility was competent, honest, and acted in the best interests of its staff. The model shows that confidence in the system's ability to manage COVID-19 cases, encouraged and supported by senior medical/nursing staff to apply recommended infection prevention and control measures, increases trust in the organization. In addition, the wellbeing of HCWs was linked to greater trust in institutions.

Proper training on prevention and control procedures for other communicable diseases; access to clear policies and protocols for everyone to follow related to infection prevention and control procedures for COVID-19; and the PPE availability during the previous clinical shift also increased trust in the organization during the pandemic. However, HCWs reported that when having access to recommended PPE, the intention to use it to care for patients with suspected or confirmed COVID-19 was inversely associated with trust. This was like the emotions index, i.e., staff concerned about becoming sick due to the risk of self-exposure and infecting their families.

TABLE 2 Trust with cutoff point 50% in comparison with study variables.

		Less than 50%		More than 50%		χ^2 test p-value
		Count	%	Count	%	
Gender	Female	139	32.0%	162	36.8%	0.13
	Male	296	68.0%	278	63.2%	
	Total	435		440		
Job role	Senior nurse	26	6.0%	33	7.5%	0.088
	Assistant nurse	223	51.4%	225	51.0%	
	Specialized doctor	37	8.5%	42	9.5%	
	Resident doctor	110	25.3%	85	19.3%	
	Allied health profession	30	6.9%	50	11.3%	
	others	8	1.8%	6	1.4%	
	Total	434		441		
Medical specialty article	acute care	245	58.8%	268	63.8%	0.193
	Internal medicine	49	11.8%	31	7.4%	
	surgery	23	5.5%	28	6.7%	
	Pediatrics	19	4.6%	15	3.6%	
	others	81	19.4%	78	18.6%	
	Total	417		420		
Place of work during COVID-19 outbreak	West Bank	327	75.2%	285	64.6%	0.002
	Jerusalem	33	7.6%	58	13.2%	
	Gaza	75	17.2%	98	22.2%	
	Total	435		441		
Type of organization you are working with	Governmental	297	68.4%	274	62.1%	0.050
	Non- governmental	137	31.6%	167	37.9%	
	Total	434		441		
Direct contact with COVID-19 patients	No	138	31.7%	128	29.0%	0.39
	Yes	297	68.3%	313	71.0%	
	Total	435		441		

Bold values are significant p-values.

Discussion

This is the first study in Palestine that provides insight into the perceptions of HCWs and the barriers and facilitators that influence the trust of staff in the institutions where they work.

This trust ultimately shapes adherence to prevention and control measures during the COVID-19 pandemic and organizational resilience. In general, the findings showed that HCWs have moderate levels of trust in their institution to manage the healthcare facility during the pandemic; be honest with staff, and act in the best interests of their staff. Several work-related factors associated with institutional trust (IT) were investigated in this study. Some personal factors like the HCWs' job role, their medical specialty, location of work, and working in high-risk units did not show a significant relationship with IT. However, confidence in the system's ability to manage COVID-19 cases and encouragement and support

from senior medical/nursing staff to apply recommended infection prevention and control measures increase trust in an organization. Other factors related to IT during a pandemic include receiving proper training on prevention and control procedures for other communicable diseases, having access to clear policies and protocols for everyone to follow related to infection prevention and control procedures for COVID-19, and the availability of PPE during the previous clinical shift.

One of the key findings of this study is that wellbeing of HCWs is associated with IT. Greater trust was reported by those with good mental health like being cheerful, relaxed, sleeping well, and feeling active. However, those worried about themselves or their families being infected with COVID-19 showed lower trust in the institution. Similar findings have been reported worldwide. Psychological strain among HCWs in European hospitals was shown to be high; one-third of HCWs reported fear in dealing with COVID-19 patients, and

TABLE 3 Binary logistic regression for the association of perceived skills, self-reported environmental context, social influences, emotions, recent use of IPC, emotions index and wellbeing with institutional trust.

		Trust				Crude odds ratio				Adjusted odds ratio			
		Less than 50 N = 435		More than 50 N = 441		Sig.	OR	95% CI OR		Sig.	aOR	95% CI aOR	
		N	%	N	%			L	U			L	U
I am confident that the healthcare service where I work can continue to manage patient demand related to COVID-19 over the next 3 months.	Disagree	182	41.9	76	17.4		1.00				1.00		
	Neutral	54	12.4	38	8.7	0.00	1.68	1.03	2.67	0.004	2.02	1.25	3.28
	Agree	198	45.6	322	73.9	0.00	3.48	2.56	4.73	0.025	1.56	1.06	2.30
I have received general training for infection, prevention and control procedures for other communicable diseases	Disagree	210	48.4	119	27.0		1.00				1.00		
	Neutral	51	11.8	37	8.4	0.31	1.28	0.79	2.06	0.383	0.782	0.450	1.36
	Agree	173	39.9	285	64.6	0.00	2.80	2.17	3.90	0.051	1.447	1.00	2.10
I intend to always use the recommended PPE when taking care of patients with suspected or confirmed COVID-19 when I have access to these.	Disagree	29	6.7	31	7.1		1.00				1.00		
	Neutral	35	8.1	19	4.3	0.07	0.51	0.23	1.06	0.017	0.320	0.126	0.814
	Agree	370	85.3	389	88.6	0.95	0.98	0.58	1.66	0.009	0.42	0.22	0.809
In the health facility where I work, I have access to clear policies and protocols for everyone to follow related to infection prevention and control procedures for COVID-19	Disagree	183	42.3	69	15.7		1.00				1.00		
	Neutral	78	18.0	54	12.3	0.007	1.84	1.18	2.86	0.12	1.51	0.89	2.55
	Agree	172	39.7	317	72.0	0.00	4.89	3.50	6.82	0.000	2.631	1.703	4.06
I am encouraged and supported by senior medical/nurse staff to apply recommended infection prevention and control measures	Disagree	131	30.3	49	11.1		1.00				1.00		
	Neutral	94	21.7	58	13.2	0.034	1.65	1.04	2.62	0.288	1.341	0.780	2.30
	Agree	208	48.0	334	75.7		4.29	2.96	6.22	0.002	2.03	1.29	3.20
Emotions index	<50	45	10.3	82	18.6		1.00				1.00		
	≥50	390	89.7	359	81.4	0.001	0.51	0.34	0.75	0.034	0.596	0.37	0.961
WHO-5 wellbeing	<50	351	80.7	315	71.4		1.00				1.00		
	≥50	84	19.3	126	28.6	0.001	1.67	1.22	2.29	0.032	1.52	1.04	2.22
PPE availability during last clinical shift ^y	Mean ± SD	5.47 ± 2.08	6.55 ± 1.71	0.00	1.37	1.26	1.47	0.001	1.18	1.07	1.29		

aOR, adjusted odds ratio; COVID-19, coronavirus disease 2019; CI, confidence interval. Binary logistic regression model after controlling for age, gender, place of work, type of institution, job role, location of work, direct vs. indirect care for COVID-19 patients. ^yPPE availability in the last week is the index sum of availability of: Hand soap, N95 respirator (FFP1 or equivalent), surgical mask, disposable apron, fluid-resistant gown, eye protection (i.e., goggles or face shield, and gloves). SD, Standard Deviation; L, lower; U, Upper.

almost all respondents were worried about the risk to their families due to their job (mean 56.3, SD \pm 19.3) (38). In our study, the situation of Palestinian HCWs was shown to be worse than that of HCWs in Europe (39). The mean of the WHO-5 wellbeing scores was 35.96 (SD \pm 21.8), which was significantly higher among female HCWs than males (38.2 vs. 34.8), and 75% of the participants reported a poor wellbeing index. A high level of fear was reported by 50 percent of health professionals in Gaza who had never worked with COVID-19 patients before compared with 27.6% who had work experience with COVID-19 patients (40). Among Saudi Arabian HCWs, 27.1% scored high on a negative emotional impact scale (41); in Germany, the COVID-19 pandemic had a negative impact on HCWs mood (48.3%), as well as restricted their private lives (42). Zhang and colleagues reported similar results in China, showing a high prevalence of severe insomnia, anxiety, depression, somatization, and obsessive-compulsive symptoms (43). In this study, multivariate analysis showed that a good wellbeing is associated positively with trust in the organization (adjusted OR 1.52, 95% CI 1.038–2.22).

In this context, the psychological distress experienced by healthcare workers may be related to their concerns about safety at work (7) and their lack of understanding of the virus. HCWs may also be worried about the shortage of medical protective equipment, the long-term workload, and the lack of rest. The study highlights that trust in an institution may be boosted by providing proper training and essential medical materials and equipment. It should also provide the proper protection and preventive measures for its employees; improve communication, establish clear protocols, and provide PPE that could enhance trust and, thus, employees' psychological wellbeing.

The TDF scale (31) was applied in this study to understand IPC behaviors during the COVID-19 pandemic and to develop targeted strategies for optimizing such behaviors at this critical time.

One key finding in this study was that HCWs lacked a sense of control during the pandemic period. Becoming infected with COVID-19 was perceived to be out of their control, although 80% agreed that this risk was part of their job. Half of HCWs (50%) felt fear when caring for COVID-19 patients; feared becoming infected while caring for patients with COVID-19 (75%) and feared transferring the infection to their families (90%). These findings indicate a high level of fear and stress among Palestinian healthcare workers during the COVID-19 pandemic. Maraqa et al. study (2020) showed that 74.0% of Palestinian HCWs reported high-stress levels during the outbreak. Fear of spreading the infection to family members was the main source of stress (91.6%) (44). Comparable results were seen in Germany where most HCWs described moderate concerns about their health (41.9%) but had strong concerns about the health of others (46.0%) (41). A study in Saudi Arabia during the Middle East respiratory syndrome coronavirus (MERS) pandemic, showed that more than two-thirds of HCWs

were worried about being infected through exposure to infected patients. It reported that the most frequently reported reasons for worry were the ability of the virus to cause severe disease or death and lack of a specific treatment (37). A hospital-based study during the MERS outbreak showed that many health workers worried about becoming sick and possibly infecting others (45).

Another important finding in this study is the lack of awareness by HCWs about prevention measures and their use; this may be one of the major reasons for the feeling of loss of control. A national Palestinian study showed that HCWs surveyed did not receive adequate training on local protocols or measures to address COVID-19 spread (58.7%) (46). In Cyprus, a study indicated that poor knowledge regarding preventive measures may directly increase the risk of COVID-19 spread (47). In addition, lack of means of protection, poor training, and inadequate PPE availability at work were strong factors affecting fear and loss of control among HCWs. In the study multivariate model, determinants for IT were receiving general training in IPC procedures for other communicable diseases, alongside access to clear policies and protocols for everyone to follow related to infection prevention and control of COVID-19. These results were like a German study in which 47.2% of all participants reported that their employer had provided specific COVID-19 training during the pandemic, and that this training was provided more often to doctors (50.9%) than to nursing staff (39.3%) (47). HCWs who received PPE training in the previous 2 years reported using the most elements of PPE and more frequently than those who did not report PPE training (48). On the contrary, in Saudi Arabia, 95.5% of HCWs reported receiving training on the safe use of personal protective tools (35). In focus group discussions in the United States, inadequate access to COVID-19 testing and uncertainty about whether their organization would support their needs if they developed an infection, was among several other factors that caused HCWs anxiety and could undermine their trust in their organizations (5). The early implementation of PPE training should be a requirement to reduce the spread of COVID-19 among HCWs (48). PPE training specifically for COVID-19 would have the most significant impact on the proper use of PPE and thus, on staff concerns and trust in their institutions.

Although 87% of HCWs reported their intention to use PPE when caring for patients, a low percentage (57%) reported having access to PPE in their healthcare facility in the current study. In the multivariate model, the intention to use PPE while caring for suspected or confirmed cases was inversely associated with IT. Interestingly, in this study, 50% of HCWs believed that using PPE would protect them sufficiently against becoming infected at work. Globally, the availability of PPE is higher in some countries than in others. In Cyprus for example, 38.7% of HCWs believed that adequate and appropriate protective equipment was readily available (47). In Germany, over 40% of medical professionals stated that there

was a regular (18.1%) or even permanent (16.5%) shortage of equipment at their institution (42). In Palestine, HCWs reported lacking in hand sanitizer (51.4%), gloves (48.6%), facemasks (72.5%), eye protection (goggles/glasses: 92.8%), and face shields (92.0%) (46). Institutional trust is a key risk attenuator for HCWs to adhere to recommended IPC use. In Saudi Arabia, the presence of a hospital policy to address employees with suspected or known exposure to the COVID-19 virus and the implementation of preventive measures reduced the negative emotional response between HCWs (41).

During pandemics, HCWs trust improves when they are empowered and supported by their managers. When HCWs feel psychologically safe, this enables better patient safety in everyday practice for all patients (5, 6). In the study multivariate model, having confidence in the system's management of COVID-19 cases, alongside encouragement and support from senior medical/nursing staff to apply the recommended infection prevention and control measures were strong determinants for institutional trust. The absence of managerial support for emotional distress can be detrimental to trust and the psychological safety of HCWs. Therefore, managers need to support HCWs and deal with any signs of emotional distress during COVID-19 (21).

Sources of information globally have been very much dependent on social media and internet access. In this study, HCWs reported that social media was their main source of information about COVID-19 (41%), followed by hospital training (24%), and official government websites (22%). In Saudi Arabia, the main source of information about the Middle East respiratory syndrome (MERS) was the internet (26%) (48). In Canada, social media was reported as a primary source of information, and healthcare workers were not satisfied with the information provided by institutions on COVID-19 (49). However, a study by Al-Ashwal et al. in Yemen found that television and radio were the main sources of information (69.5%), followed by social media (63.6%), and only 25.5% of HCWs acquired knowledge from peer-reviewed scientific articles (50). Staff may seek information *via* social media because of the high risk of infection posed by the COVID-19 virus that prompts HCWs to gain a better understanding of the nature of the disease, the characteristics of the causative agent, evaluation of self-susceptibility and vulnerability, and to evaluate the efficacy of the available preventive measures (34). Another possible explanation is that this disease is new and health institutions were not well-prepared to face this challenge due to a lack of scientific information about it. This could motivate HCWs to search social media for the latest information.

Our study had some limitations. The survey took place during the second peak of the pandemic and under a partial lockdown. In this period, HCWs experienced extreme stress at work and at their personal level which may exaggerate their

responses. Also, this is a cross-sectional study which makes it a challenge to identify the cause-effect relationship between the independent and dependent variables. In addition, obtaining the data through self-report questionnaires makes it liable for reporting bias; those interested in the topic of feeling stress chose to respond. Also, we were unable to compare the differences between responders and non-responders.

Despite the caution in the generalization of the findings, the findings of the current study about HCWs' trust in their organization are a crucial contribution to the literature review.

Practical implications

The study has practical implications for crisis communication and management. Its findings can be tailored to provide a set of recommendations that can be used to limit the negative outcomes associated with low levels of trust in institutions during health crises like the COVID-19 pandemic in the Palestinian context.

Changing infrastructure, work policies, and staffing to reduce risk and weariness in order to adjust service delivery in such pandemics is necessary. Capacity building across all cadres for emergency preparedness should be fostered to ensure a smooth transition of HCWs from diverse divisions/specialties to emergency response circumstances. In collaboration with the WHO, the Ministry of Health and other healthcare providers must conduct systematic and periodic training on IPC protection protocols. Training protocols must be continually updated and distributed to HCWs *via* tele-health systems, organizations' websites, and personal e-mails. Therefore, digital triaging could be used as a less resource-intensive way to protect HCWs from emerging viral infections, which can be done through structural changes in health facilities to easy triaging. Moreover, illness surveillance methods and health information infrastructures must be strengthened to have data analytics in health surveillance.

Additionally, the institutions should facilitate access to mental health resources such as psychological counseling, practicing meditation, and debriefing. For example, developing HCWs community groups that allow connections and reduce feelings of isolation would help in socializing within these teams.

Increased human resources, training response teams, and providing housing for teams to be away from their families and alleviate stress should all be part of the disaster preparedness plan. Also, the institutions should also provide individual and organizational support to HCWs in nutrition, physical exercise, sleep quality, and reducing burnout. Furthermore, communication with leadership should be improved to facilitate problem solutions and provide incentives (such as specific raises in salary and personal recognition) to encourage HCWs motivation. In addition, health institutions should

work to improve human resources and support supplies to reduce workload.

Policy implications

The main findings of our study show that several factors, including crisis management, policy decision-makers' wellbeing, and health professionals' physical and emotional wellbeing, might influence employee trust in institutions. As a result, local policy guidelines must be developed in collaboration with various healthcare providers and implemented in future outbreaks.

A policy for enhancing working conditions in terms of employment stability and social security should be implemented. This might be accomplished by enhancing HCWs' terms and conditions of employment by altering their pay scale, which could be secured by locating suitable financing sources. Furthermore, policies are required to foster a working environment that protects HCWs' mental health and wellbeing, thereby improving their quality of life and achieving a better work-life balance. In such instances, sustaining the provision of services by various healthcare providers, particularly the Ministry of Health, to enable the procurement of products and services, ensure the supply of medicines, and ensure the supply of personal protective equipment (PPE), is also critical. These policies, which address the protection and care of HCWs, indicate the need for more investment in this area.

Based on the COVID-19 pandemic experience, the MoH should have an emergency preparedness plan. To effectively deliver best practices, the plan should provide training and essential medical materials and equipment, including management based on the latest evidence and provision of appropriate protection and prevention measures. Therefore, a task force maybe created to help mitigate physical, mental, social or economic effects on HCWs, even after the current pandemic is over.

The research institutions and universities need to carry out studies to understand the effect of communication strategies such as media impact and information sharing on workers' perspectives. Also, understanding the environmental influences such as social and cultural beliefs will assist in developing potential interventions to support HCWs in future pandemics.

Conclusions

In general, the findings showed that HCWs have moderate levels of trust in their institution to manage the healthcare facility during the pandemic; be honest with staff, and act in the best interests of their staff. Several factors were associated with institutional trust (IT) such as receiving proper training,

having access to clear policies and protocols, the availability of PPE, and feeling emotional. Therefore, strategies to promote trust and resilience in healthcare workers must be developed and implemented to counter the psychological distress they faced during this crisis. HCWs should be provided with clear, accessible communications about policies and protocols, as well as training about infection prevention and control, personal protective equipment, and support during pandemics to increase their trust in the healthcare system. Additionally, the improvement in HCWs' wellbeing can be attributed to a greater sense of trust in institutions. Finally, policymakers and authorities should invest in training and better employment circumstances for HCWs to ensure long-term healthcare security in reaction to the COVID-19 pandemic or possible future epidemics.

Future work is needed for evaluating factors that contribute to change in trust, beliefs, and skills during outbreaks, in addition, to determining the proper policies needed to be implemented in these healthcare settings.

Author's note

Nuha El Sharif is an associate professor of Public Health. Muna Ahmead has a PhD in Mental Health. Asma Imam is an associate professor of Health Management and Quality Control. El Sharif has research experience in healthcare workers' exposure in the workplace, cancer epidemiology and other non-communicable diseases, and extensive experience with data analysis and model development. Ahmead has experience in research related to PTSD, cancer, depression, fear of death, quality of life, and other mental health issues. Imam's main research interests are in quality of life with emphasis on cancer patients and the elderly, and quality of healthcare and reproductive health.

Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding author/s.

Ethics statement

The studies involving human participants were reviewed and approved by Palestinian Ministry of Health Ethical Committee (REF: R0/1508/11/59) and Al Quds University Research Ethical Committee (Ref No. 150/Rec/2020) in accordance with the Declaration of Helsinki. The patients/participants provided their written informed consent to participate in this study.

Author contributions

NS and AI designed the survey and developed the study tool. NS was responsible for supervision of software development, data collection, data entry, and study analysis. NS, MA, and AI participated and were responsible for writing the manuscript. All authors read and approved the final manuscript.

Funding

The study was funded by the World Health Organization, Geneva, Switzerland (Grant number 2020/1059265-2).

Acknowledgments

We would like to thank the World Health Organization for funding this study in Palestine. We would like to thank Dr. Nina Gobat, WHO consultant, for her leadership and her team who continuously supported us throughout the survey planning, implementation and analysis. We thank Phoung Pham, Denis Hout and the other presenting groups for sharing their experience in this survey and data analysis. Special recognition is due to healthcare workers, all the participating institutions, the Ministry of Health and Al Quds University for their support throughout this pandemic and for the studies that are conducted in Palestine. Thanks to our study collaborators

and study team: Ahmad Shitat (MoH Gaza), Ibtisam Titi (MoH West Bank), Issa Ghrouz (MoH West Bank), Samer Asad (MoH West Bank), and the Faculty of Public Health students: Wafa Hamdan, Margret Zaid, Feras Daglas and Dalal Zawahreh.

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/fpubh.2022.947593/full#supplementary-material>

References

1. Singh DR, Sunuwar DR, Shah SK, Karki K, Sah LK, Adhikari B, et al. Impact of COVID-19 on health services utilization in Province-2 of Nepal: a qualitative study among community members and stakeholders. *BMC Health Serv Res.* (2021) 21:174. doi: 10.1186/s12913-021-06176-y
2. World Health Organization. *COVID-19 Continues to Disrupt Essential Health Services in 90% of Countries Title.* Geneva: World Health Organization (2021).
3. Gee S, Skovdal M. The role of risk perception in willingness to respond to the 2014–2016 West African Ebola outbreak: a qualitative study of international health care workers. *Glob Heal Res Policy.* (2017) 2:1–10. doi: 10.1186/s41256-017-0042-y
4. Shaukat N, Mansoor A, Razzak J, Shaukat N, Ali DM, Razzak J. Physical and mental health impacts of COVID-19 on healthcare workers: a scoping review. *Int J Emerg Med.* (2020) 13:1–8. doi: 10.1186/s12245-020-00299-5
5. Rangachari P. Preserving organizational resilience, patient safety, and staff retention during COVID-19 requires a holistic consideration of the psychological safety of healthcare workers. *Int J Environ Res Public Health.* (2020) 17:4267. doi: 10.3390/ijerph17124267
6. Rakesh G, Pier K, Costales TL. A call for action : cultivating resilience in healthcare providers. *Am J Psychiatry.* (2017) 12:3–5. doi: 10.1176/appi.ajp.2017.120402
7. Riess H. Institutional resilience : the foundation for individual resilience, especially during COVID-19. *Glob Adv Heal Med.* (2021) 10:4–6. doi: 10.1177/21649561211006728
8. Stéphanie Tillement, Céline Cholez TR. Assessing organizational resilience: an interactionist approach. *M@n@gement.* (2009) 12:230–65. doi: 10.3917/mana.124.0230
9. Nickell LA, Crighton EJ, Tracy CS, Al-Enazy H, Bolaji Y, Hanjrah S, et al. Psychosocial effects of SARS on hospital staff: survey of a large tertiary care institution. *Cmaj.* (2004) 170:793–8. doi: 10.1503/cmaj.1031077
10. Parker MJ, Goldman RD. Paediatric emergency department staff perceptions of infection control measures against severe acute respiratory syndrome. *Emerg Med J.* (2006) 23:349–53. doi: 10.1136/emj.2005.026146
11. Albarrak AI, Mohammed R, Al Elayan A, Al Fawaz F, Al Masry M, Al Shammari M, et al. Middle east respiratory syndrome (MERS): comparing the knowledge, attitude and practices of different health care workers. *J Infect Public Health.* (2021) 14:89–96. doi: 10.1016/j.jiph.2019.06.029
12. Baumann AO, Blythe JM, Underwood JM. Surge capacity and casualization. *Can J Public Heal.* (2006) 97:230–2. doi: 10.1007/BF03405592
13. Ofner-Agostini M, Gravel D, McDonald LC, Lem M, Sarwal S, McGeer A, et al. Cluster of cases of severe acute respiratory syndrome among Toronto healthcare workers after implementation of infection control precautions: a case series. *Infect Control Hosp Epidemiol.* (2006) 27:473–8. doi: 10.1086/504363
14. World Health Organization. *Infection Prevention and Control During Health Care When Novel Coronavirus (nCoV) Infection Is Suspected.* (2020). Available online at: <https://apps.who.int/iris/rest/bitstreams/1266296/retrieve> (accessed April 14, 2022).
15. Powell-Jackson T, King JJC, Makungu C, Spieker N, Woodd S, Risha P, et al. Infection prevention and control compliance in Tanzanian outpatient facilities: a cross-sectional study with implications for the control of COVID-19. *Lancet Glob Health.* (2020) 8:e780–9. doi: 10.1016/S2214-109X(20)30222-9

16. Lambe KA, Lydon S, Madden C, Vellinga A, Hehir A, Walsh M, et al. Handhygiene compliance in the ICU: a systematic review. *Crit Care Med.* (2019) 47:1251–7. doi: 10.1097/CCM.0000000000003868
17. Yang Q, Wang X, Zhou Q, Tan L, Zhang X, Lai X. Healthcare workers' behaviors on infection prevention and control and their determinants during the COVID-19 pandemic: a cross-sectional study based on the theoretical domains framework in Wuhan, China. *Arch Public Heal.* (2021) 79:1–10. doi: 10.1186/s13690-021-00641-0
18. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry.* (2020) 7:e14. doi: 10.1016/S2215-0366(20)30047-X
19. Agnoli C, Gironi S, Sieri S, Sacerdote C, Vineis P, Tumino R, et al. Colorectal cancer risk and dyslipidemia: a case-cohort study nested in an Italian multicentre cohort. *Cancer Epidemiol.* (2014) 38:144–51. doi: 10.1016/j.canep.2014.02.002
20. Wang X, Zhang X, He J. Challenges to the system of reserve medical supplies for public health emergencies: reflections on the outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epidemic in China. *Biosci Trends.* (2020) 14:3–8. doi: 10.5582/bst.2020.01043
21. Legido-Quigley H, Mateos-García JT, Campos VR, Gea-Sánchez M, Muntaner C, McKee M. The resilience of the Spanish health system against the COVID-19 pandemic. *Lancet Public Heal.* (2020) 5:e251–2. doi: 10.1016/S2468-2667(20)30060-8
22. Buowari DY, Emeribe NA, Ogbonna VI, Esievoadje ES, Odimegwu CL, Isokariari OM, et al. Physicians' trust in health systems during the COVID-19 pandemic in Nigeria. *J Med Womens Assoc Niger.* (2021) 6:129–35. doi: 10.4103/jmwa.jmwa_13_21
23. Silverberg SL, Puchalski Ritchie LM, Gobat N, Murthy S. COVID-19 infection prevention and control procedures and institutional trust: Perceptions of Canadian intensive care and emergency department nurses. *Can J Anesth.* (2021) 68:1165–75. doi: 10.1007/s12630-021-02028-9
24. Japan International Cooperation Agency (JICA), and India office. *Impact of COVID-19 Pandemic on Medical Healthcare Workers in Mumbai City, India.* Japan International Cooperation Agency, and India Office. (2021). Available online at: https://www.jica.go.jp/india/english/office/others/c8h0vm0000fdjmmnd-att/study_02.pdf (accessed April 2022).
25. Mahamid FA, Veronese G, Bdier D. Fear of coronavirus (COVID-19) and mental health outcomes in Palestine: the mediating role of social support. *Curr Psychol.* (2021) 20:1–10. doi: 10.1007/s12144-021-02395-y
26. World Bank. *World Bank Country and Lending Groups, Countries Classification.* (2022). Available online at: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups> (accessed April 2022).
27. ANERA. *Health Care System in Palestine.* Available online at: <https://www.anera.org/blog/healthcare-in-palestine/September> (accessed April 2022).
28. World Health Organization. *A Coordinated Global Research Roadmap: 2019 Novel Coronavirus Global Research and Innovation Forum: Towards a Research Roadmap.* Geneva: World Health Organization (2020).
29. World Health Organization. *Perceptions of Healthcare Workers Regarding Local Infection Prevention and Control Procedures for COVID-19: Research Protocol.* Geneva: World Health Organization (2020).
30. World Health Organization. *Infection Prevention and Control During Health Care When Novel Coronavirus (nCoV) Infection Is Suspected: Interim Guidance.* Geneva: World Health Organization (2020).
31. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implement Sci.* (2012) 7:37. doi: 10.1186/1748-5908-7-37
32. Atkins L, Francis J, Islam R, O'Connor D, Patey A, Ivers N, et al. A guide to using the theoretical domains framework of behaviour change to investigate implementation problems. *Implement Sci.* (2017) 12:77. doi: 10.1186/s13012-017-0605-9
33. Freimuth VS, Musa D, Hilyard K, Quinn SC, Kim K. Trust during the early stages of the 2009 H1N1 pandemic. *J Health Commun.* (2014) 19:321–39. doi: 10.1080/10810730.2013.811323
34. Zhang C, Yang L, Liu S, Ma S, Wang Y, Cai Z, et al. Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. *Front psychiatry.* (2020) 11:306. doi: 10.3389/fpsy.2020.00306
35. Mirza W, Mirza AM, Saleem MS, Chacko PP, Ali M, Tarar MN, et al. Well-being assessment of medical professionals in progressive levels of training: derived from the WHO-5 well-being index. *Cureus.* (2018) 10:e3790. doi: 10.7759/cureus.3790
36. Topp CW, Østergaard SD, Søndergaard S, Bech P. The WHO-5 well-being index: a systematic review of the literature. *Psychother Psychosom.* (2015) 84:167–76. doi: 10.1159/000376585
37. Yesavage JA, Brink TL, Rose TL, Lum O, Huang V, Adey M, et al. Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiatr Res.* (1982) 17:37–49. doi: 10.1016/0022-3956(82)90033-4
38. UNOCHA. KoBoToolbox Software Program. *The United Nations Office for the Coordination of Humanitarian Affairs.* Kobo Inc. (2018). Available online at: <https://www.kobotoolbox.org/>
39. Hout D van, Hutchinson P, Wanat M, Pilbeam C, Goossens H, Anthierens S, et al. The experience of European hospital-based health care workers on following infection prevention and control procedures for COVID-19. *medRxiv.* (2020) 2020:20248793. doi: 10.1101/2020.12.23.20248793
40. Shehada AK, Albelbeisi AH, Albelbeisi A, El Bilbeisi AH, El Afifi A. The fear of COVID-19 outbreaks among health care professionals in Gaza Strip, Palestine. *SAGE Open Med.* (2021) 9:20503121211022987. doi: 10.1177/205031212111022987
41. Alreshidi NM, Haridi HK, Alaseeri R, Garcia M, Gaspar F, Alrashidi L. Assessing healthcare workers' knowledge, emotions and perceived institutional preparedness about COVID-19 pandemic at Saudi hospitals in the early phase of the pandemic. *J Public Health Res.* (2020) 9:432–9. doi: 10.4081/jphr.2020.1936
42. Paffenholz P, Peine A, Hellmich M, Paffenholz S V, Luedde M, Haverkamp M, et al. Perception of the 2020 SARS-CoV-2 pandemic among medical professionals in Germany: results from a nationwide online survey. *Emerg Microbes Infect.* (2020) 9:1590–9. doi: 10.1080/22221751.2020.1785951
43. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom.* (2020) 89:242–50. doi: 10.1159/000507639
44. Marqqa B, Nazzal Z, Zink T. Palestinian health care workers' stress and stressors during COVID-19 pandemic : a cross-sectional study. *J Prim Care Community Health.* (2020) 11:2150132720955026. doi: 10.1177/2150132720955026
45. Abolfotouh MA, Alqarni AA, Al-ghamdi SM, Salam M, Al-assiri MH, Balkhy HH. An assessment of the level of concern among hospital-based health-care workers regarding MERS outbreaks in Saudi Arabia. *BMC Infect Dis.* (2017) 17:1–10. doi: 10.1186/s12879-016-2096-8
46. Alser O, Alghoul H, Alkhateeb Z, Hamdan A, Albarqouni L, Saini K. Healthcare workers preparedness for COVID-19 pandemic in the occupied Palestinian territory: a cross-sectional survey. *BMC Health Serv Res.* (2021) 21:766. doi: 10.1186/s12913-021-06804-7
47. Roupa Z, Polychronis G, Latzourakis E, Nikitara M, Ghobrial S. Assessment of knowledge and perceptions of health workers regarding COVID-19 : a cross-sectional study from cyprus. *J Community Health.* (2021) 46:251–8. doi: 10.1007/s10900-020-00949-y
48. Khan MU, Shah S, Ahmad A, Fatokun O. Knowledge and attitude of healthcare workers about middle east respiratory syndrome in multispecialty hospitals of Qassim, Saudi Arabia. *BMC Public Health.* (2014) 14:1–7. doi: 10.1186/1471-2458-14-1281
49. Piché-Renaud PP, Groves HE, Kitano T, Arnold C, Thomas A, Streitenberger L, et al. Healthcare worker perception of a global outbreak of novel coronavirus (COVID-19) and personal protective equipment: Survey of a pediatric tertiary-care hospital. *Infect Control Hosp Epidemiol.* (2021) 42:261–7. doi: 10.1017/ice.2020.415
50. Al-ashwal FY, Kubas M, Id MZ, Id NB, Saeed RM, Azhar S, et al. preparedness, counselling practices, and perceived barriers to confront COVID-19: a cross-sectional study from a war-torn country. *PLoS ONE.* (2000) 514:1–16. doi: 10.1371/journal.pone.0243962



OPEN ACCESS

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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

RECEIVED 29 August 2022

ACCEPTED 30 September 2022

PUBLISHED 17 October 2022

CITATION

Ning L, Jia H, Yu J, Gao S, Shang P,
Cao P and Yu X (2022) Mental health
among healthcare workers during the
prolonged COVID-19 pandemic: A
cross-sectional survey in Jilin Province
in China.

Front. Public Health 10:1030808.
doi: 10.3389/fpubh.2022.1030808

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Mental health among healthcare workers during the prolonged COVID-19 pandemic: A cross-sectional survey in Jilin Province in China

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Background: The prolonged COVID-19 pandemic has seriously impacted the mental health of healthcare workers. This study aimed to explore the mental health status of healthcare workers, compare the differences in mental health between physicians and nurses, and verify the impact of risk perception on mental health in the long-term COVID-19 pandemic in Jilin Province, China.

Methods: A stratified random sample was used to conduct an on-site questionnaire survey in December 2020 to measure the mental health status, risk perceptions, and demographic characteristics of healthcare workers in Jilin Province, China. A total of 3,383 participants completed the questionnaire survey, of which 3,373 were valid questionnaires.

Results: A total of 23.6% ($n = 795$) of participants had symptoms of depression, 27.4% ($n = 923$) had symptoms of anxiety, and 16.3% ($n = 551$) had symptoms of stress. Physicians reported significantly higher rates of depression and anxiety than nurses ($p = 0.023$, $p = 0.013$, respectively). There was no significant difference in the proportion of participants with stress between physicians and nurses ($p = 0.474$). Multivariate logistic regression results showed that healthcare workers who had a high level of risk perception were more likely to have symptoms of depression (AOR = 4.12, $p < 0.001$), anxiety (AOR = 3.68, $p < 0.001$), and stress (AOR = 4.45, $p < 0.001$) after controlling for other variables.

Conclusion: At least one in six healthcare workers experienced mental health problems, and physicians were more likely than nurses to suffer from depression during the prolonged COVID-19 epidemic. Risk perception was highly predictive of depression, anxiety, and stress symptoms in medical staff. Public health interventions are needed to mitigate the long-term psychological impact of the COVID-19 pandemic.

KEYWORDS

COVID-19, healthcare worker, mental health, DASS-21, cross-sectional survey

Introduction

The outbreak of the COVID-19 pandemic in early 2020 continues to threaten societies all over the world and has had a major impact on health systems (1). The World Health Organization (WHO) declared the COVID-19 pandemic a Public Health Emergency of international concern in January 2020 (2), and researchers generally agreed that the outbreak of COVID-19 is likely to be the worst pandemic since the 1918 influenza pandemic (3). COVID-19 continues to spread internationally, with the totals for infections and deaths rising. How governments and communities around the world have responded to the COVID-19 pandemic has varied widely (4). Studies have shown that the pandemic is still an ongoing major public health challenge (5).

The mental health status of health professionals has attracted much attention during the COVID-19 pandemic. Previous studies have demonstrated that COVID-19 has introduced a global macrostressor that has a major negative influence on the mental health of populations worldwide (6), and many studies have shown that the impact of COVID-19 on the mental health of medical staff has been more severe than that of the general public (7). Scientific evidence has revealed that healthcare workers, especially those on the front-line of the epidemic, have endured enormous psychological pressure during the COVID-19 pandemic because of increased workload, the risk of exposure to COVID-19, fatigue, burnout, stigma, etc. (8). In addition, the risk effect has been amplified due to extensive media coverage that may increase the perception of risk among medical staff. The perceived and actual need for healthcare workers to go to the front lines of the epidemic to support prevention efforts, resulting in a break in the routine work style, may further increase their mental health burdens (9). A study conducted in the UK and the US found that front-line healthcare workers had increased risk of contracting COVID-19 compared to the general populations (10). Previous studies have observed fatigue, decreased cognitive function and job performance, stress, crying, suicidal intention and other problems (11, 12). Lai et al.'s survey of healthcare workers during the outbreak in Wuhan showed that the proportions of respondents reporting symptoms of depression, anxiety, insomnia, and suffering were 50.4, 44.6, 34.0, and 71.5%, respectively (13). Female nurses on the front-lines working in Wuhan, China, reported more severe measures of all mental health symptoms than other healthcare workers. The negative impact on healthcare workers does not only affect the prevention and control of COVID-19 but may also lead to other serious consequences, such as lower morale of healthcare workers, lower job satisfaction, higher absenteeism, and lower quality of medical services or treatment (14, 15). The psychological problems of healthcare workers in the context of a pandemic have become a focus of attention for scholars and health departments, and the protection against psychological

problems in healthcare workers during a pandemic has become an important issue.

Few studies have looked at the long-term effects of infectious diseases on the mental health of health care workers, but the results have been inconsistent. Wu et al. found that usual ward nurses were more prone to burnout during the epidemic than frontline nurses, suggesting the need to pay attention to medical staff who deal with COVID-19 daily during this crisis (16). Similarly, Lee et al. found a significant increase in mental health problems among healthcare workers a year after the SARS outbreak (17). The longitudinal study by Cai et al. of Chinese medical personnel showed that depression, anxiety, and posttraumatic stress disorder symptoms were significantly higher during the outbreak than during the stabilization of the outbreak (18). However, Zhou's longitudinal study of healthcare workers on emergency medical assistance teams supporting Hubei Province found that healthcare workers were in a worse mental state after returning to their hometown (19). The results from another year-long longitudinal study of health workers in emergency departments in Singapore by Th'ng et al. showed significant improvement in anxiety symptoms and a significant increase in depressive symptoms 1 year after the outbreak (20).

Several studies have focused on differences in psychological problems between physicians and nurses during the COVID-19 pandemic, and most of these findings suggest that nurses are prone to more severe mental health problems during the current outbreak (21–23). A study of Belgian health professionals found that 63.2% of nurses reported symptoms of anxiety compared to 23.5% of doctors (24). However, a few studies reflect inconsistent findings. A cross-sectional survey conducted by Wang and colleagues in four hospitals in Guangdong Province, China, showed that physicians were more likely to suffer from moderate or severe depression than nurses (25). A longitudinal study in Singapore showed an increased prevalence of depression among a population of physicians in emergency departments in 2021 compared with a year earlier, and also showed higher total depression scores in this population than nursing staff (20). A comprehensive understanding of the vulnerability of healthcare workers' mental health in the context of the COVID-19 pandemic is critical for the development of relevant preventative and social policies during a pandemic. It is necessary to continue to compare the differences in mental health issues between physician and nurse populations during the prolonged COVID-19 pandemic.

According to cognitive assessment theory, risk perception can be considered a form of threat assessment and thus a determinant of mental health responses (26). According to the psychometric paradigm of Slovic, risk perception has two dimensions, "fear" and "unknown" (27), which are exacerbated in healthcare workers by the prevalence of COVID-19. A large body of previous research from psychology, clinical medicine, and economics suggests that risk perceptions often

drive emotional and psychological distress (28). Several studies have assessed risk perceptions associated with COVID-19 and mental health. Ding et al. found that risk perceptions of COVID-19 were associated with levels of depression (29). Teufel et al. observed similar levels of risk perception and levels of COVID-19-related fear, depression, and generalized anxiety (30). However, while some studies have suggested an association between risk perception and mental health, others have questioned whether this association can be attributed to differences in sample selection, methodology, and social context between studies (31). In addition, previous studies mainly focused on the general public, and paid little attention to the association between risk perception and mental health among medical staff. Therefore, there is a need to further explore the relationship between risk perceptions and mental health among medical staff during the prolonged COVID-19 epidemic.

The Joint WHO-China 2019 report on the Coronavirus Disease Mission from February 16 to 24, 2020, suggests that China has begun to return to normal (32). According to statistics from the National Health Commission of China (33), Jilin Province had new cases in February, May, and July following the first confirmed cases announced on January 22, 2020. The number of confirmed cases in July reached 138, the highest in the whole year. Subsequently, the epidemic crisis in Jilin Province ended and there were no further outbreaks by the end of the year. Despite the absence of new cases in Jilin Province during this period, there are still clusters or scattered outbreaks of cases in other Chinese provinces and cities as well as globally. Jilin Province continues to face potential threats and pressures, and healthcare workers remain in a highly stressful state of risk preparedness. Therefore, we conducted a study during the regular prevention and control of the COVID-19 epidemic in Jilin Province to achieve three research objectives: (1) investigating the prevalence of the mental health among healthcare workers, (2) comparing the differences in mental health between physicians and nurses in China, and (3) exploring the impact of risk perception on mental health.

Materials and methods

Design and sample

Most data collection efforts on healthcare workers' mental health used online surveys to obtain samples, because of the COVID-19 pandemic. Despite the strengths of flexibility, speed, timeliness, convenience, etc., online surveys still have unavoidable weaknesses, such as sample selection bias, and low implementation and response rates, which may have some effect on sample representativeness (34). This study conducted an on-site cross-sectional survey of medical staff in public hospitals in Jilin Province from December 1 to December 30, 2020. First, a stratified sampling method was used to divide all

public hospitals in Jilin Province into municipal public hospitals and county public hospitals. Since urban public hospitals are more clustered, 25% of public hospitals were randomly selected according to their region, type, and level. Since counties are more dispersed and public hospitals at the county level are more heterogeneous, one public general hospital and one public TCM hospital were randomly selected in each county. Ultimately, 29 municipal public hospitals and 80 county-level public hospitals were included in the study sample. Then, 20 doctors and 10 nurses were selected from each hospital for the on-site survey using a quota sampling method. The criteria for inclusion in this study were: in-service physicians and nurses between 18 and 60, were able to complete the questionnaire on their own and agreed to participate in the study. The exclusion criteria for participants were: physicians and nurses who were on leave during the period of investigation; did not want to participate in the study and were supporting other regions due to the COVID-19 pandemic.

Sample size

We used PASS 15 to estimate the study sample. we calculated a sample size value of 2449, assuming that the 50% of healthcare workers have mental health problems and setting the confidence level at 95% and the margin of error at 2%. Considering the non-response rate and missing values, the final sample size was inflated by 20% to be 3061.

Data collection

Our study was approved by the Medical Ethics Committee of Jilin University and IRB code is No. 2019-12-03. The purpose and protocol of the study were clearly explained by the investigator at the beginning of the survey. Participants had to agree to the study statement before starting the questionnaire. In total, 3,383 people participated the questionnaire. The collected questionnaires were verified and 10 questionnaires with logical errors were excluded, resulting in a valid sample size of 3373 (99.7% of the returned questionnaires) for inclusion in the study.

Measurement

Demographic variables

The demographic variables in this study included hospital location, gender, age, marital status, education level, department, professional title, working years, average monthly income, and whether or not they were exposed to COVID-19 positive patients. Previous studies suggest an association between demographic variables and mental health in the COVID-19 epidemic.

Risk perception

Risk perception was measured with a scale based on a previous study during the SARS outbreak in 2003 to measure healthcare workers' threat perception of COVID-19-related risks (35). The scale consists of 10 items such as "I believed that my job poses a great risk to me" which were rated on a 5-point Likert scale (1 = completely disagree and 5 = completely agree). The language of Risk Perception Scale is Chinese and the results of reliability and validity analysis show that the risk perception scale had good reliability (Cronbach's α = 0.870) and validity (RMSEA = 0.985, GFI = 0.986, TLI = 0.957). The average score of all items above 3 was deemed high in risk perception.

Mental health

We measured depression, anxiety and stress to assess the mental health of medical staff during the COVID-19 epidemic. Depression is a condition characterized by a sad mood, low self-esteem, apathy, and when severe, suicidal impulses; while anxiety often manifests itself as excessive worry, hypervigilance; symptoms of stress are usually associated with excitement or tension as a result of a lack of coping strategies (36).

The Chinese version of the Depression Anxiety and Stress Scale (DASS-21 scale) was used in this study to assess the prevalence of depression, anxiety, and stress among healthcare workers in China. The DASS-21 scale was originally developed by Lovibond (36), and Gong developed a Chinese version of the scale based on it (37). The scale has been used in several studies in China during the COVID-19 epidemic (38, 39). In this study, the Cronbach's α of the total DASS-21 scale was 0.971, indicating that the scale has good reliability. The results of the confirmatory factor analysis indicated that the scales had good validity (CFI = 0.984, TLI = 0.976, RMSEA = 0.049).

The scale contains 3 subscales, and each subscale comprises seven items covering depression, anxiety, and stress. Items on the depression scale assess symptoms of dysphoric mood, and example items include "I could not seem to experience any positive feeling at all." Items on the anxiety scale measure symptoms pertaining to physiological hyperarousal, such as "I was aware of dryness of my mouth." Items on the stress scale evaluate negative affectivity, such as, "I found it hard to wind down." A 4-point Likert scale was used for all responses (0 = never a problem, 1 = sometimes a problem, 2 = often a problem, and 3 = almost always a problem).

We multiplied each score by two for comparison with the original 42 items of the DASS scale (40). The total score of each dimension was categorized as "normal," "mild," "moderate," "severe," and "extremely severe," according to the DASS manual. On the depression scale, 0–9 indicates normal depression, 10–13 indicates mild depression, 14–20 indicates moderate depression, 21–27 indicates severe depression and 28–42 indicates extremely severe depression. On the anxiety scale, 0–7 indicates normal, 8–9 indicates considered mild anxiety, 10–14 indicates moderate anxiety, 15–19 indicates

severe anxiety and 20–42 indicates extremely severe anxiety. On the stress scale, 0–14 indicates normal, 15–18 indicates mild stress, 19–25 indicates moderate stress, 26–33 indicates severe stress and 34–42 indicates extremely severe stress. Participants who fell into the "mild" or higher category were identified as experiencing symptoms of depression, anxiety, or stress.

Statistical analysis

Our study described the characteristics of the study participants by frequency analysis. The mean and standard deviation (SD) of the scores for each risk perception entry were calculated, and the physician and nurse groups were compared using independent *t*-test. A chi-square test was used to test for differences in the prevalence of depression, anxiety, and stress symptoms between the physician and nurse groups.

Participants were divided into two groups: those who suffered from symptoms of depression, anxiety, or stress, and those who did not. A chi-square test was used to compare significant differences between different demographic characteristics and depression, anxiety, and stress. Three logistic regression models were developed to identify predictors of depression, anxiety, and stress symptoms. Variables related to sociodemographic characteristics, work-related variables, and risk perception variables were entered into the regression models. To test the robustness of the results of the logistic regression model, we developed a linear regression model that treated depression, anxiety, and stress symptom scores as a continuous variable (Supplementary material).

IBM SPSS Statistics 25 programs were used for statistical analysis.

Results

Demographic characteristics of respondents

As shown in Table 1, 63.7% of the sample were doctors, and 36.3% were nurses in total. Most of the respondents were female (69.8%), 31–45 years old (52.9%), married (79.8%), had a bachelor's degree (61.2%), had a junior or not-professional rank (44.4%), had <10 years of work experience (45.3%) and had a monthly income of 5,000 yuan or less (63.3%).

Prevalence of depression, anxiety, and stress symptoms in the sample

Table 2 demonstrates the percentages of healthcare workers who experienced various levels of symptoms of depression, anxiety, and stress. In total, 23.6% ($n = 795$) of the respondents had symptoms of depression, 27.4% ($n = 923$) of participants

TABLE 1 Sociodemographic characteristics of study participants.

Characteristics	Total		Doctors		Nurses	
	<i>n</i> = 3373	%	<i>n</i> = 2149	%	<i>n</i> = 1224	%
Hospital location						
Urban	867	25.7	569	26.5	298	24.3
County	2506	74.3	1580	73.5	926	75.7
Gender						
Male	1018	30.2	991	46.1	27	2.2
Female	2355	69.8	1158	53.9	1197	97.8
Age						
18–30	832	24.7	424	19.7	408	33.3
31–45	1784	52.9	1171	54.5	613	50.1
>45	757	22.4	554	25.8	203	16.6
Marital status						
Unmarried/Divorced/widowed	680	20.2	418	19.5	262	21.4
Married	2693	79.8	1731	80.5	962	78.6
Education level						
Junior college or below	1010	29.9	523	24.3	487	39.8
Bachelor's degree	2065	61.2	1361	63.3	704	57.5
Master degree or above	298	8.8	265	12.3	33	2.7
Health care unit						
Internal Medicine	1175	34.8	803	37.4	372	30.4
Surgery	641	19.0	394	18.3	247	20.2
Obstetrics and Gynecology	210	6.2	126	5.9	84	6.9
Pediatrics	154	4.6	99	4.6	55	4.5
Chinese medicine	142	4.2	125	5.8	17	1.4
Public health section	18	0.5	11	0.5	7	0.6
Other sections (Laboratory, etc.)	1033	30.6	591	27.5	442	36.1
Professional rank						
Junior/No	1498	44.4	822	38.3	676	55.2
Middle	1034	30.7	700	32.6	334	27.3
Senior	841	24.9	627	29.2	214	17.5
Working years						
<10	1528	45.3	998	46.4	530	43.3
10–20	1131	33.5	680	31.6	451	36.8
>20	714	21.2	471	21.9	243	19.9
Average monthly income (CNY)						
≤5000	2136	63.3	1239	57.7	897	73.3
>5000	1237	36.7	910	42.3	327	26.7
Exposure to confirmed or suspected cases						
Yes	284	8.4	175	8.1	109	8.9
No	3089	91.6	1974	91.9	1115	91.1

had symptoms of anxiety, 16.3% ($n = 551$) of participants had symptom of stress.

In addition, Table 2 also shows statistically significant differences in the proportions of different levels of depression and anxiety symptoms between the doctors and nurse groups, with significantly more physicians reporting depression and anxiety than nurses ($p = 0.023$, $p = 0.013$, respectively). There was no significant difference in the proportion of participants with stress between doctors and nurses ($p = 0.474$).

Risk perception of respondents

Table 3 shows the risk perception scores of the healthcare workers. On the risk perception sections of the survey, a total of 596 (17.7%) respondents gave a rating higher than 3 out of a possible score of 5. A total of 379 (17.6%) doctors had a high level of risk perception about COVID-19, and 217 (17.7%) nurses had a high level of risk perception. No significant differences were found for perceived risk between doctors and nurses ($p = 0.946$).

TABLE 2 Prevalence of depression, anxiety and stress symptoms in the sample.

	Total		Doctor		Nurse		<i>p</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Depression							0.023
Normal	2578	76.4	1607	74.8	971	79.3	
Mild	191	5.7	133	6.2	58	4.7	
Moderate	361	10.7	250	11.6	111	9.1	
Severe	98	2.9	60	2.8	38	3.1	
Extremely severe	145	4.3	99	4.6	46	3.8	
Anxiety							0.013
Normal	2450	72.6	1537	71.5	913	74.6	
Mild	120	3.6	70	3.3	50	4.1	
Moderate	337	10.0	242	11.3	95	7.8	
Severe	139	4.1	93	4.3	46	3.8	
Extremely severe	327	9.7	207	9.6	120	9.8	
Stress							0.474
Normal	2822	83.7	1785	83.1	1037	84.7	
Mild	152	4.5	105	4.9	47	3.8	
Moderate	157	4.7	97	4.5	60	4.9	
Severe	141	4.2	95	4.4	46	3.8	
Extremely severe	101	3.0	67	3.1	34	2.8	

Univariate analysis of symptoms of depression, anxiety, and stress

As shown in Table 4, univariate analysis demonstrated that hospital location, education level, professional rank, career category, risk perception, and exposure to COVID-19 cases were significantly associated with symptoms of depression ($p < 0.05$); hospital location, health care unit, risk perception, and exposure to COVID-19 cases were significantly associated with symptoms of anxiety ($p < 0.05$); and gender, risk perception, and exposure to COVID-19 cases were significantly associated with symptoms of stress ($p < 0.05$).

Factors associated with symptoms of depression, anxiety, and stress

The results of correlation analysis and VIF showed that there was no multicollinearity between the independent variables (Supplementary material).

Multivariate logistic regression results as shown in Table 5 revealed that healthcare workers in urban public hospitals (AOR = 1.41, $P = 0.001$), those with a master's degree or higher (AOR = 1.56, $P = 0.012$), those with a mid-level rank (AOR = 1.43, $P = 0.003$), and those with high-risk perceptions (AOR = 4.12, $P < 0.001$) were more likely to suffer from depression. Nurses (AOR = 0.80, $P = 0.037$) were less likely to

develop depression than physicians; healthcare workers in urban public hospitals (AOR = 1.35, $P = 0.002$), those with high-risk perception (AOR = 3.68, $P < 0.001$), and those in contact with COVID-19 patients (AOR = 1.53, $P = 0.002$) were more likely to have anxiety disorders; healthcare workers in urban public hospitals (AOR = 1.26, $P = 0.048$), those with high-risk perceptions (AOR = 4.45, $P < 0.001$) were more likely to suffer from stress, while women (AOR = 0.75, $P = 0.021$) were less likely to suffer from stress than men.

Discussion

The purpose of this study was to assess the mental health problem among physicians and nurses in Jilin Province, China, during a period of regular COVID-19 epidemic prevention and control. The COVID-19 epidemic in China was sporadically distributed across several regions, while Jilin Province had no confirmed COVID-19 cases or deaths for seven consecutive months, indicating a relatively stable epidemic situation in the region during the investigation. There is substantial evidence in the previous literature that healthcare workers may have a considerable burden of psychological distress during an outbreak, which has a significant impact on their mental health, outbreak prevention and control efforts, and healthcare decisions (10, 41).

Our study showed that the estimated prevalence rates of depression, anxiety, and stress symptoms were 23.6, 27.4, and

TABLE 3 Risk perception of respondents.

	Risk perception scores (M±SD)				Risk perception score > 3 [<i>n</i> (%)]			
	Total	Doctor	Nurse	<i>p</i>	Total	Doctor	Nurse	<i>p</i>
1. I believed that my job poses a great risk to me	2.86 ± 1.23	2.87 ± 1.23	2.86 ± 1.23	0.810	1019 (30.2)	643 (29.9)	376 (30.7)	0.627
2. I felt extra stress at work	2.82 ± 1.23	2.86 ± 1.23	2.73 ± 1.23	0.003	1015 (30.1)	681 (31.7)	334 (27.3)	0.007
3. I was afraid of falling ill with COVID-19	2.87 ± 1.41	2.84 ± 1.39	2.91 ± 1.42	0.188	1155 (34.2)	712 (33.1)	443 (36.2)	0.072
4. I often worried about whether I am infected	2.25 ± 1.23	2.23 ± 1.22	2.28 ± 1.26	0.336	577 (17.1)	350 (16.3)	227 (18.5)	0.094
5. I thought I may not survive if I got COVID-19	1.70 ± 1.03	1.70 ± 1.03	1.71 ± 1.03	0.742	253 (7.5)	160 (7.4)	93 (7.6)	0.871
6. I have thought about resigning because of COVID-19	1.31 ± 0.73	1.33 ± 0.78	1.26 ± 0.65	0.007	100 (3.0)	74 (3.4)	26 (2.1)	0.030
7. I was afraid I would pass COVID-19 on to others	2.40 ± 1.37	2.36 ± 1.37	2.45 ± 1.38	0.065	771 (22.9)	475 (22.1)	296 (24.2)	0.167
8. My family and friends are worried that I will infect them	2.14 ± 1.26	2.16 ± 1.26	2.10 ± 1.25	0.188	550 (16.3)	349 (16.2)	201 (16.4)	0.891
9. People avoided my family because of my work	1.71 ± 1.04	1.74 ± 1.06	1.66 ± 1.00	0.027	268 (7.9)	184 (8.6)	84 (6.9)	0.079
10. I was at risk of contacting COVID-19 patients in the hospital	2.97 ± 1.38	2.96 ± 1.36	2.99 ± 1.41	0.533	1265 (37.5)	782 (36.4)	483 (39.5)	0.076
Total scores	23.02 ± 8.18	23.06 ± 8.16	22.96 ± 8.22	0.716	596 (17.7)	379 (17.6)	217 (17.7)	0.946

TABLE 4 Univariate analysis of symptom of depression, anxiety, and stress.

	Depression (mild or higher category)				Anxiety (mild or higher category)				Stress (mild or higher category)			
	<i>n</i>	%	χ^2	<i>p</i>	<i>n</i>	%	χ^2	<i>p</i>	<i>n</i>	%	χ^2	<i>p</i>
Hospital location			20.399	<0.001			12.971	<0.001			3.044	0.081
County	542	21.6			645	25.7			393	15.7		
Urban	253	29.2			278	32.1			158	18.2		
Gender			2.274	0.132			1.277	0.258			7.901	0.005
Male	257	25.2			292	28.7			194	19.1		
Female	538	22.8			631	26.8			357	15.2		
Age			2.039	0.361			0.208	0.901			1.372	0.504
18–30	186	22.4			227	27.3			127	15.3		
31–45	438	24.6			484	27.1			292	16.4		
>45	171	22.6			212	28.0			132	17.4		
Marital status			0.779	0.378			0.225	0.636			0.128	0.720
Unmarried/Divorced/widowed	169	24.9			191	28.1			108	15.9		
Married	626	23.3			732	27.2			443	16.5		
Education level			19.732	<0.001			3.870	0.144			2.448	0.294
Junior college or below	221	21.9			272	26.9			177	17.5		
Bachelor's degree	473	22.9			555	26.9			321	15.5		
Master degree or above	101	33.9			96	32.2			53	17.8		
Health care unit			12.081	0.060			18.203	0.006			10.439	0.107
Internal Medicine	299	37.6			352	38.1			210	38.1		
Surgery	160	20.1			188	20.4			111	20.1		
Obstetrics and Gynecology	44	5.5			50	5.4			23	4.2		
Pediatrics	31	3.9			29	3.1			19	3.4		
Chinese medicine	35	4.4			39	4.2			22	4.0		
Public health section	0	0			1	0.1			1	0.2		
Other sections (Laboratory, etc.)	226	28.4			264	28.6			165	29.9		
Professional rank			14.176	0.001			4.074	0.130			3.939	0.140
Junior/No	311	20.8			389	26.0			225	15.0		
Middle	281	27.2			283	27.4			174	16.8		
Senior	203	24.1			251	29.8			152	18.1		
Working years			1.116	0.572			0.105	0.949			1.317	0.518
<10	356	23.3			419	27.4			238	15.6		
10–20	278	24.6			306	27.1			189	16.7		
>20	161	22.5			198	27.7			124	17.4		
Average monthly income(CNY)			0.084	0.772			0.194	0.659			0.080	0.777
≤5000	500	23.4			579	27.1			346	16.2		
>5000	295	23.8			344	27.8			205	16.6		
Career category			8.966	0.003			3.697	0.054			1.573	0.210
Doctor	542	25.2			612	28.5			364	16.9		
Nurse	253	20.7			311	25.4			187	15.3		
Risk perception			223.402	<0.001			206.479	<0.001			235.382	<0.001
≤3	514	18.5			618	22.3			328	11.8		
>3	281	47.1			305	51.2			223	37.4		
Exposure to COVID-19 cases			7.756	0.005			17.742	<0.001			5.209	0.022
No	709	23.0			815	26.4			491	15.9		
Yes	86	30.3			108	38.0			60	21.1		

TABLE 5 Factors associated with symptom of depression, anxiety, and stress.

	Depression (mild or higher category)			Anxiety (mild or higher category)			Stress (mild or higher category)		
	AOR	95%CI	<i>p</i>	AOR	95%CI	<i>p</i>	AOR	95%CI	<i>p</i>
Hospital location									
County (reference)									
Urban	1.41	1.16–1.71	0.001	1.35	1.12–1.62	0.002	1.26	1.00–1.57	0.048
Gender									
Male (reference)									
Female	0.99	0.80–1.23	0.939	1.01	0.82–1.24	0.915	0.75	0.58–0.96	0.021
Age									
18–30 (reference)			0.520			0.642			0.627
31–45	0.90	0.68–1.19	0.466	0.90	0.69–1.18	0.453	0.93	0.67–1.29	0.669
>45	0.78	0.52–1.19	0.253	0.83	0.56–1.23	0.358	0.80	0.50–1.28	0.351
Marital status									
Unmarried/Divorced/widowed (reference)									
Married	0.81	0.64–1.03	0.088	0.91	0.73–1.14	0.428	0.94	0.71–1.23	0.651
Education level									
Junior college or below (reference)			0.007			0.320			0.186
Bachelor's degree	0.97	0.79–1.19	0.741	0.93	0.77–1.13	0.492	0.83	0.66–1.04	0.103
Master degree or above	1.56	1.10–2.20	0.012	1.15	0.82–1.62	0.405	0.99	0.66–1.49	0.962
Health care unit									
Internal medicine (reference)			0.824			0.039			0.248
Surgery	0.98	0.77–1.25	0.868	0.97	0.77–1.22	0.813	0.87	0.66–1.14	0.315
Obstetrics and Gynecology	0.81	0.55–1.18	0.266	0.74	0.52–1.05	0.095	0.58	0.36–0.94	0.027
Pediatrics	0.78	0.50–1.20	0.260	0.56	0.36–0.87	0.010	0.71	0.42–1.19	0.192
Chinese medicine	0.88	0.58–1.35	0.572	0.85	0.57–1.27	0.429	0.78	0.47–1.28	0.320
Public health section	0.00	0.00	0.998	0.14	0.02–1.10	0.062	0.29	0.04–2.24	0.233
Other Sections (Laboratory, etc.)	0.89	0.72–1.10	0.294	0.84	0.69–1.02	0.078	0.89	0.70–1.12	0.317
Professional rank									
Junior/No (reference)			0.012			0.222			0.405
Middle	1.43	1.13–1.81	0.003	1.08	0.86–1.35	0.503	1.14	0.87–1.49	0.340
Senior	1.33	0.96–1.84	0.082	1.30	0.96–1.76	0.087	1.28	0.89–1.83	0.188

(Continued)

TABLE 5 (Continued)

	Depression (mild or higher category)			Anxiety (mild or higher category)			Stress (mild or higher category)		
	AOR	95%CI	<i>p</i>	AOR	95%CI	<i>p</i>	AOR	95%CI	<i>p</i>
Working years									
<10 (reference)			0.844			0.955			0.914
10–20	1.07	0.84–1.35	0.579	0.97	0.77–1.21	0.777	1.04	0.80–1.37	0.761
>20	1.03	0.72–1.46	0.889	0.96	0.69–1.34	0.806	1.09	0.73–1.63	0.679
Average monthly income (CNY)									
≤5000 (reference)									
>5000	0.87	0.71–1.07	0.176	0.92	0.75–1.11	0.372	0.91	0.72–1.15	0.418
Career category									
Doctor (reference)									
Nurse	0.80	0.64–0.99	0.037	0.86	0.70–1.05	0.134	0.99	0.78–1.27	0.954
Risk perception									
≤3 (reference)									
>3	4.12	3.40–5.00	0.000	3.68	3.05–4.44	0.000	4.45	3.62–5.47	0.000
Exposure to COVID–19 cases									
No (reference)									
Yes	1.23	0.93–1.64	0.150	1.53	1.17–2.00	0.002	1.21	0.88–1.67	0.247

16.3%, respectively, in the population as a whole. A study conducted by Teris Cheung in 2015 on nurses in Hong Kong, China, showed that 35.8% of participants had a prevalence of depression, 37.3% had symptoms of anxiety and 41.1% had symptoms of stress. In their study, the results of depression, anxiety and stress were all higher than those in our study (42). In addition, the level of emotional distress among healthcare workers was lower in our study compared to an early 2020 study (13, 43). The first month of the COVID-19 study conducted by Benedetta Demartini in Italy showed that 41.5% of the population experienced pathological depression, 38.2% experienced anxiety, and 48% experienced stress (43). The results study conducted in Wuhan, China in early 2020 were 50.4% for depression, 44.6% for anxiety, and 71.5% for stress (13). However, the results of the present study differ from those of previous studies following infectious disease epidemics. Lee et al.'s study showed that SARS survivors exhibited worrying levels of psychological stress 1 year after the SARS outbreak, manifesting alarmingly high levels of depression, anxiety, and posttraumatic symptoms, as well as high rates of potential cases of psychiatric disorders (17). Lee suggests that the results may be related to concerns about the complications of SARS and

its treatment, economic issues or stigma. We suggest that the results of this study may be related to the stage of development of the COVID-19 epidemic. The gradual control of the epidemic with appropriate government intervention and the reduction of patients could improve the psychological state by reducing the stress of security threats to medical personnel (44). In addition, adequate protective equipment and experience in prevention and control may also contribute to the psychological relief of health care workers.

We found that the prevalence of depression and anxiety was significantly higher in the physician population than in the nurse population in Jilin Province in the context of a seven-month period with no new cases of Covid-19 during normative prevention and control (depression, 25.2% for physicians vs. 20.7% for nurses; anxiety, 28.5% for physicians vs. 25.4% for nurses, $p < 0.05$), which differs from the results of many other previous related studies (21–23). Some studies suggest that the nature of nurses' work, which requires them to be in close contact with patients and to work longer hours, can lead to more severe mental health problems (13, 22, 23). However, some studies show similarities to our results. In other studies, increased mental health symptoms amongst physicians were

attributed to burnout caused by the dual stress of the physician population needing to assess and diagnose patients and the stress of COVID-19 infection. Burnout is a state of physical and mental exhaustion that occurs as a result of being in an emotionally demanding work environment for a long period (45). Maslach et al. described burnout as a three-dimensional syndrome consisting of emotional exhaustion, personal depersonalization, and reduced personal accomplishment (46). Numerous previous studies have confirmed the correlation between burnout and depressive symptoms in medical professionals (47). The results of a survey conducted during the Spanish outbreak showed that physicians experienced higher levels of burnout than nurses, possibly related to the added stress on physicians in a crisis needing to make quick, correct decisions amongst unknown factors (48). This is supported by our study's finding that medical professionals with master's degrees or higher and mid-level titles were more likely to experience depressive symptoms. This is likely because related studies have shown that education and job title have an impact on burnout among healthcare workers (49, 50).

The multivariate logistic regression results of this study showed that risk perception was a significant factor that influenced depression, anxiety, and stress in healthcare workers and that healthcare workers with high-risk perception were 3–4 times more likely to suffer from depression, anxiety, and stress than those with low-risk perception. Previous studies have also found a strong correlation between perceived risk and emotional distress in the context of COVID-19, which is consistent with other studies during the pandemic. According to Slovic's psychometric paradigm, there are two main dimensions of risk perception: "fear" and "unknown" (27). The occurrence of a public health emergency is likely to stimulate these two psychological dimensions in people; the perception of risk drives emotional reactions and psychological distress. According to social stress theory, the threat of COVID-19 may trigger significant stress in groups, leading to high levels of risk perception, which may lead to mental health problems (51). In addition, studies have shown that individuals' subjective perceptions of risk may not be consistent with the objective situation. Therefore, it is necessary to focus on the subjective risk perceptions of medical personnel regarding COVID-19 infection during the stabilization of the epidemic, and guide them to maintain a correct and positive subjective perception of the risk of COVID-19 infection, thereby alleviating emotional distress and improving mental health problems of medical personnel.

One interesting observation from our study is that although exposure to COVID-19 patients was associated with depression, anxiety, and stress in the univariate analysis, medical staff exposed to newly diagnosed patients were more likely to suffer from anxiety after controlling for other variable interference, while depression and stress did not demonstrate significant differences, which may be related to the long period without

new cases in Jilin Province during the survey period, while the national epidemic continued to emerge. We also found that health professionals with a master's degree or higher were more likely to suffer from depression, which is inconsistent with other results (52) and may be related to the fact that those with higher education among health professionals tend to take on heavier workloads and decision-making tasks. In addition, consistent with other studies, we found that medical staff in urban public hospitals were more likely to suffer from depression and anxiety symptoms, which may be related to the higher workload of urban medical staff compared to county medical staff and the higher number of anti-epidemic tasks supporting other provinces with epidemics. In contrast to previous studies, our study found that men were more likely to suffer from stress symptoms than women, which may be related to the fact that the Chinese physician population is predominantly male.

This study has some limitations. First, because this study used a cross-sectional design, no inferences can be made about the causal relationships of the variables. Second, some healthcare workers supported other cities during the survey, which may have led to some bias in the sampling. Third, due to the large variation in the number of healthcare workers between hospitals, we used the quota sampling method. However, it is non-probability sampling and has limitations in terms of sample representativeness. Fourth, according to Jilin Statistical Yearbook (2021), a total of 212,140 health technical personnel and 3,066,700 hospital admissions in Jilin Province in 2020. The ratio is 0.069. Previous studies have mentioned shortage of health human resources as a cause of increased stress and mental health problems during the COVID-19 pandemic and an exploration of the shortage of human resources for health is lacking in our study. Future studies may need to consider further research on the mental health of healthcare workers in prolonged epidemics through longitudinal studies, probability sampling methods and consideration of human resources for health issues.

Conclusion

Compared with those reported during the early outbreak of COVID-19 in the early 2020s, mental health problems among healthcare workers were lower in a stable prevention-and-control situation and corroborated converged recent national and international studies. Physicians were more likely to suffer from depression than nurses. Risk perception was highly predictive of depression, anxiety, and stress symptoms among medical personnel.

Data availability statement

The datasets presented in this article are not readily available because the datasets are currently used for another project,

but are available from the corresponding author on reasonable request. Requests to access the datasets should be directed to XY, xhyu@jlu.edu.cn.

Author contributions

Conceptualization: XY and LN. Methodology: HJ and LN. Formal analysis and investigation: SG, PS, and PC. Writing—original draft preparation: LN. Writing—review and editing: JY and HJ. Funding acquisition and supervision: XY. All authors contributed to the article and approved the submitted version.

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/fpubh.2022.1030808/full#supplementary-material>

References

1. Been JV, Ochoa LB, Bertens LCM, Schoenmakers S, Steegers EAP, Reiss EKM. Impact of COVID-19 mitigation measures on the incidence of preterm birth: a national quasi-experimental study. *Lancet Public Health*. (2020) 5:E604–11. doi: 10.1016/S2468-2667(20)30223-1
2. WHO. WHO Director-General's opening remarks at the media briefing on COVID-19–11 March 2020. (2020). Available online at: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19> (accessed March 11, 2020).
3. Oliveira JF, Jorge DCP, Veiga RV, Rodrigues MS, Torquato MF, da Silva NB, et al. Mathematical modeling of COVID-19 in 148 million individuals in Bahia, Brazil. *Nat Commun*. (2021) 12:333. doi: 10.1038/s41467-020-19798-3
4. Akinin LB, Andretti B, Goldszmidt R, Helliwell JF, Petherick A, De Neve JE, et al. Policy stringency and mental health during the COVID-19 pandemic: a longitudinal analysis of data from 15 countries. *Lancet Public Health*. (2022) 7:e417–26. doi: 10.1016/S2468-2667(22)00060-3
5. Yu L, Wang J, Li X, Mao L, Sui Y, Chen W, et al. Simultaneous detection of SARS-CoV-2 and pandemic (H1N1) 2009 virus with real-time isothermal platform. *Heliyon*. (2021) 7:e07584. doi: 10.1016/j.heliyon.2021.e07584
6. Dlugosz P, Kryvachuk L. Neurotic generation of Covid-19 in Eastern Europe. *Front Psychiatry*. (2021) 12:654590. doi: 10.3389/fpsyt.2021.654590
7. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 Epidemic in China. *Psychother Psychosom*. (2020) 89:242–50. doi: 10.1159/000507639
8. Tsamakidis K, Tsipsios D, Ouranidis A, Mueller C, Schizas D, Terniotis C, et al. COVID-19 and its consequences on mental health (Review). *Exp Ther Med*. (2021) 21:1. doi: 10.3892/etm.2021.9675
9. De Kock JH, Latham HA, Leslie SJ, Grindle M, Munoz SA, Ellis L, et al. Rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. *BMC Public Health*. (2021) 21:104. doi: 10.1186/s12889-020-10070-3
10. Nguyen LH, Drew DA, Graham MS, Joshi AD, Guo CG, Ma WJ, et al. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. *Lancet Public Health*. (2020) 5:E475–83. doi: 10.1016/S2468-2667(20)30164-X
11. Shen X, Zou X, Zhong X, Yan J, Li L. Psychological stress of ICU nurses in the time of COVID-19. *Crit Care*. (2020) 24:200. doi: 10.1186/s13054-020-02926-2
12. Sun P, Wang M, Song T, Wu Y, Luo J, Chen L, et al. The Psychological impact of COVID-19 pandemic on health care workers: a systematic review and meta-analysis. *Front Psychol*. (2021) 12:626547. doi: 10.3389/fpsyg.2021.626547
13. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. (2020) 3:e203976. doi: 10.1001/jamanetworkopen.2020.3976
14. Brooks SK, Dunn R, Amlot R, Rubin GJ, Greenberg N. A systematic, thematic review of social and occupational factors associated with psychological outcomes in healthcare employees during an infectious disease outbreak. *J Occup Environ Med*. (2018) 60:248–57. doi: 10.1097/JOM.0000000000001235
15. Brooks SK, Gerada C, Chalder T. Review of literature on the mental health of doctors: are specialist services needed? *J Ment Health*. (2011) 20:146–56. doi: 10.3109/09638237.2010.541300
16. Wu Y, Wang J, Luo C, Hu S, Lin X, Anderson AE, et al. Comparison of burnout frequency among oncology physicians and nurses working on the frontline and usual wards during the COVID-19 epidemic in Wuhan, China. *J Pain Symptom Manage*. (2020) 60:e60–5. doi: 10.1016/j.jpainsymman.2020.04.008
17. Lee AM, Wong JG, McAlonan GM, Cheung V, Cheung C, Sham PC, et al. Stress and psychological distress among SARS survivors 1 year after the outbreak. *Can J Psychiatry*. (2007) 52:233–40. doi: 10.1177/070674370705200405
18. Cai ZX, Cui Q, Liu ZC, Li JJ, Gong X, Liu JF, et al. Nurses endured high risks of psychological problems under the epidemic of COVID-19 in a longitudinal study in Wuhan China. *J Psychiatr Res*. (2020) 131:132–7. doi: 10.1016/j.jpsychires.2020.09.007
19. Zhou YF, Ding HL, Zhang YF, Zhang BY, Guo YR, Cheung T, et al. Prevalence of poor psychiatric status and sleep quality among frontline healthcare workers during and after the COVID-19 outbreak: a longitudinal study. *Transl Psychiat*. (2021) 11:1–6. doi: 10.1038/s41398-020-01190-w
20. Th'ng F, Rao KA, Ge LX, Mao D, Neo HN, De Molina JA, et al. A one-year longitudinal study: changes in depression and anxiety in frontline emergency department healthcare workers in the COVID-19 pandemic. *Int J Env Res Pub He*. (2021) 18:11228. doi: 10.3390/ijerph182111228
21. Shaukat N, Ali DM, Razzak J. Physical and mental health impacts of COVID-19 on healthcare workers: a scoping review. *Int J Emerg Med*. (2020) 13:1–8. doi: 10.1186/s12245-020-00299-5
22. Pappa S, Sakkas N, Sakka E. A year in review: sleep dysfunction and psychological distress in healthcare workers during the COVID-19 pandemic. *Sleep Med*. (2022) 91:237–45. doi: 10.1016/j.sleep.2021.07.009

23. Fteropoulis T, Kalavana TV, Yiallourou A, Karaiskakis M, Koliou Mazeri M, Vryonides S, et al. Beyond the physical risk: Psychosocial impact and coping in healthcare professionals during the COVID-19 pandemic. *J Clin Nurs*. (2021) 00:1–15. doi: 10.1111/jocn.15938
24. Tiete J, Guatterri M, Lachaux A, Matossian A, Hougardy JM, Loas G, et al. Mental health outcomes in healthcare workers in COVID-19 and non-COVID-19 care units: a cross-sectional survey in Belgium. *Front Psychol*. (2021) 11:612241. doi: 10.3389/fpsyg.2020.612241
25. Wang HJ, Huang DZ, Huang HG, Zhang JH, Guo L, Liu YT, et al. The psychological impact of COVID-19 pandemic on medical staff in Guangdong, China: a cross-sectional study. *Psychol Med*. (2022) 52:884–92. doi: 10.1017/S0033291720002561
26. Folkman S, Lazarus RS, Dunkel-Schetter C, DeLongis A, Gruen RJ. Dynamics of a stressful encounter: cognitive appraisal, coping, and encounter outcomes. *J Pers Soc Psychol*. (1986) 50:992. doi: 10.1037/0022-3514.50.5.992
27. Slovic P. Perception of risk. *Science*. (1987) 236:280–5. doi: 10.1126/science.3563507
28. Loewenstein GF, Weber EU, Hsee CK, Welch N. Risk as feelings. *Psychol Bull*. (2001) 127:267–86. doi: 10.1037/0033-2909.127.2.267
29. Ding Y, Xu J, Huang S, Li P, Lu C, Xie S. Risk perception and depression in public health crises: evidence from the COVID-19 crisis in China. *Int J Env Res Pub He*. (2020) 17:5728. doi: 10.3390/ijerph17165728
30. Teufel M, Schweda A, Dörrie N, Musche V, Hetkamp M, Weismüller B, et al. Not all world leaders use Twitter in response to the COVID-19 pandemic: impact of the way of Angela Merkel on psychological distress, behaviour and risk perception. *J Public Health*. (2020) 42:644–6. doi: 10.1093/pubmed/fdaa060
31. Imai H, Okumiyu K, Fukutomi E, Wada T, Ishimoto Y, Kimura Y, et al. Association between risk perception, subjective knowledge, and depression in community-dwelling elderly people in Japan. *Psychiatry Res*. (2015) 227:27–31. doi: 10.1016/j.psychres.2015.03.002
32. He M, Xian Y, Lv X, He J, Ren Y. Changes in body weight, physical activity, and lifestyle during the semi-lockdown period after the outbreak of COVID-19 in China: an online survey. *Disaster Med Public Health Prep*. (2020) 14:1–6. doi: 10.1017/dmp.2020.237
33. China NHCO. *The latest updates on COVID-19 outbreaks*. Available online at: http://www.nhc.gov.cn/xcs/yqtb/list_gzbd.shtml (accessed September, 2020).
34. Evans JR, Mathur A. The value of online surveys: a look back and a look ahead. *Internet Res*. (2018) 28:854–87. doi: 10.1108/IntR-03-2018-0089
35. Wu P, Fang YY, Guan ZQ, Fan B, Kong JH, Yao ZL, et al. The psychological impact of the SARS epidemic on hospital employees in china: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiat*. (2009) 54:302–11. doi: 10.1177/070674370905400504
36. Lovibond PF, Lovibond SH. The structure of negative emotional states—comparison of the depression anxiety stress scales (dass) with the beck depression and anxiety inventories. *Behav Res Ther*. (1995) 33:335–43. doi: 10.1016/0005-7967(94)00075-U
37. Gong X, Xie XY, Xu R, Luo YJ. (2010). Psychometric properties of the Chinese versions of DASS-21 in Chinese college students. *Chinese J Clin Psychol*. 44:3–6. doi: 10.16128/j.cnki.1005-3611.2010.04.020
38. Wang CY, Pan RY, Wan XY, Tan YL, Xu LK, McIntyre RS, et al. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain Behavior Immun*. (2020) 87:40–8. doi: 10.1016/j.bbi.2020.04.028
39. Du JF, Mayer G, Hummel S, Oetjen N, Gronewold N, Zafar A, et al. Mental health burden in different professions during the final stage of the COVID-19 lockdown in China: cross-sectional survey study. *J Med Internet Res*. (2020) 22:e24240. doi: 10.2196/24240
40. Lovibond SH, Lovibond PF. *Manual for the Depression Anxiety Stress Scales*. Psychology Foundation of Australia (1996).
41. Gold JA. Covid-19: adverse mental health outcomes for healthcare workers. *BMJ-Brit Med J*. (2020) 5:369. doi: 10.1136/bmj.m1815
42. Cheung T, Yip PSF. Depression, anxiety and symptoms of stress among Hong Kong nurses: a cross-sectional study. *Int J Env Res Pub He*. (2015) 12:11072–100. doi: 10.3390/ijerph120911072
43. Demartini B, Nistico V, D'Agostino A, Priori A, Gambini O. Early psychiatric impact of COVID-19 pandemic on the general population and healthcare workers in Italy: a preliminary study. *Front Psychiatry*. (2020) 11:561345. doi: 10.3389/fpsyg.2020.561345
44. Wang LQ, Zhang M, Liu GM, Nan SY, Li T, Xu L, Xue Y, et al. Psychological impact of coronavirus disease (2019) (COVID-19) epidemic on medical staff in different posts in China: a multicenter study. *J Psychiatr Res*. (2020) 129:198–205. doi: 10.1016/j.jpsychires.2020.07.008
45. Schaufeli WB, Greenglass ER. Introduction to special issue on burnout and health. *Psychol Health*. (2001) 16:501–10. doi: 10.1080/08870440108405523
46. Maslach C, Jackson SE. The measurement of experienced burnout. *J Occup Behav*. (1981) 2:99–113. doi: 10.1002/job.4030020205
47. Duarte I, Teixeira A, Castro L, Marina S, Ribeiro C, Jacome C, et al. Burnout among Portuguese healthcare workers during the COVID-19 pandemic. *BMC Public Health*. (2020) 20:1–10. doi: 10.1186/s12889-020-09980-z
48. Ruiz-Fernandez MD, Ramos-Pichardo JD, Ibanez-Masero O, Cabrera-Troya J, Carmona-Rega MI, Ortega-Galan AM. Compassion fatigue, burnout, compassion satisfaction and perceived stress in healthcare professionals during the COVID-19 health crisis in Spain. *J Clin Nurs*. (2020) 29:4321–30. doi: 10.1111/jocn.15469
49. Cao Y, Gao L, Fan L, Jiao M, Li Y, Ma Y. The influence of emotional intelligence on job burnout of healthcare workers and mediating role of workplace violence: A cross sectional study. *Front Public Health*. (2022) 10:892421. doi: 10.3389/fpubh.2022.892421
50. Xu WC, Pan ZJ, Li Z, Lu S, Zhang L. Job burnout among primary healthcare workers in rural China: a multilevel analysis. *Int J Env Res Pub He*. (2020) 17:727. doi: 10.3390/ijerph17030727
51. Aneshensel CS. Social stress—theory and research. *Annu Rev Sociol*. (1992) 18:15–38. doi: 10.1146/annurev.so.18.080192.000311
52. Alghamdi BS, Alatawi Y, Alshehri FS, Tayeb HO, AboTaleb H, Binsalman A. Psychological distress during COVID-19 curfews and social distancing in Saudi Arabia: A cross-sectional study. *Front Public Health*. (2022) 9:792533. doi: 10.3389/fpubh.2021.792533



OPEN ACCESS

EDITED BY

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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

RECEIVED 17 July 2022

ACCEPTED 10 October 2022

PUBLISHED 02 November 2022

CITATION

Peng P, Chen Q, Liang M, Liu Y,
Chen S, Wang Y, Yang Q, Wang X, Li M,
Wang Y, Hao Y, He L, Wang Q, Zhang J,
Ma Y, He H, Zhou Y, Li Z, Xu H, Long J,
Qi C, Tang Y-Y, Liao Y, Tang J, Wu Q
and Liu T (2022) A network analysis of
anxiety and depression symptoms
among Chinese nurses in the late
stage of the COVID-19 pandemic.
Front. Public Health 10:996386.
doi: 10.3389/fpubh.2022.996386

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Wang, Yang, Wang, Li, Wang, Hao, He,
Wang, Zhang, Ma, He, Zhou, Li, Xu,
Long, Qi, Tang, Liao, Tang, Wu and Liu.
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A network analysis of anxiety and depression symptoms among Chinese nurses in the late stage of the COVID-19 pandemic

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Background: Nurses are at high risk for depression and anxiety symptoms after the outbreak of the COVID-19 pandemic. We aimed to assess the network structure of anxiety and depression symptoms among Chinese nurses in the late stage of this pandemic.

Method: A total of 6,183 nurses were recruited across China from Oct 2020 to Apr 2021 through snowball sampling. We used Patient Health Questionnaire-9 (PHQ-9) and Generalized Anxiety Disorder scale-7 (GAD-7) to assess depression and anxiety, respectively. We used the Ising model to estimate the network. The index "expected influence" and "bridge expected influence" were applied to determine the central symptoms and bridge symptoms of the anxiety-depression network. We tested the stability and accuracy of the network via the case-dropping procedure and non-parametric bootstrapping procedure.

Result: The network had excellent stability and accuracy. Central symptoms included "restlessness", "trouble relaxing", "sad mood", and "uncontrollable worry". "Restlessness", "nervous", and "suicidal thoughts" served as bridge symptoms.

Conclusion: Restlessness emerged as the strongest central and bridge symptom in the anxiety-depression network of nurses. Intervention on depression and anxiety symptoms in nurses should prioritize this symptom.

KEYWORDS

depression, anxiety, network analysis, COVID-19 pandemic, nurse

Introduction

Approximately two-fifths of the nurses suffered from anxiety and depression symptoms after the breakout of the COVID-19 pandemic (1), which led to their impaired quality of life and attrition (2, 3). Moreover, growing evidence demonstrated the psychological harm of the pandemic persisted even long after the initial peak of the pandemic (4–8). These studies warranted long-term investigation, identification, and intervention of mental distress among nurses in the late stage of COVID-19.

Despite the high interest in the prevalence and correlation of mental distress among nurses, few studies assessed them at a symptom level. The use of total scores of a scale as an index of mental distress (e.g., calculating the total scores of depression measurement tools and interpreting it as the severity of depression) in previous studies failed to point out the difference and the interaction within the symptoms (9). In contrast, a symptom-based approach might provide more useful insights into the establishment, prevention, and treatment of mental distress (9). Network analysis is a promising tool for understanding the symptomology of psychiatric disorders (10). It assumes that disorders are composed of interacting symptoms, which permits finding the most influential symptoms (i.e., “central symptom”) in the disorders (11). It also provides new insights into the incidence of comorbidity by identifying the bridge symptoms across networks of different disorders (12). Center and bridge symptoms are vital in triggering and maintaining the disorder network, which might serve as potential intervention targets. Increasing studies applied the network approach to assess anxiety and depression among the general population, college students, adolescents, and clinicians during the COVID-19 pandemic, which documented both common and unique depression-anxiety network across different populations (13–17). However, as far as we know, no previous study described anxiety and depression symptoms among nurses via the network model.

Hence, we conducted the present study to assess anxiety and depression symptoms among a large sample of Chinese nurses with the network approach in the late stage of the COVID-19 pandemic. We aimed to demonstrate the central and bridge symptoms within the depression-anxiety network among

nurses, which might be valuable in preventing and treating depression and anxiety in the nursing population.

Materials and methods

Study setting and participants

The online questionnaire-based cross-sectional study was conducted from October 2020 to April 2021. During this period, China entered the late stage of the COVID-19 pandemic. Despite the strict “Zero-COVID-19” policy (18), the nationwide lockdown policy was ended. Only two cities experienced a short local lockdown in this period. Participants were recruited with a snowball sampling technique. The online survey was conducted on Wenjuanxin (a popular questionnaire website in China). We distributed the survey link through WeChat, the most widely used social platform in China. Participants were encouraged to forward this survey link to their friends. The inclusion criteria were as follows: (1) aged over 18 and Chinese; (2) worked as nurses during the pandemic; and (3) willing to take participate in this study. Nursing students were not included. All participants gave informed consent. Participants could only submit the questionnaires after responding to all questions. The study was approved by the ethics committee of the Second Xiangya Hospital of Central South University.

Measures

Demographic characteristics (age, gender, married status, and education level) and work-related characteristics (occupation, practicing years, title, and workplace) were collected.

Depression and anxiety were assessed via Patient Health Questionnaire-9 (PHQ-9) and General Anxiety Disorder scale-7 (GAD-7). Both of the scales applied a 4-Likert-like question and participants rated the frequency of anxiety and depression symptoms ranging from 0 (Not at all) to 3 (Almost every day). The two scales gained strong validity and were widely used in the Chinese population (19, 20). The Cronbach’s alpha of PHQ-9 and GAD-7 in our study was 0.901 and 0.929, showing excellent reliability. A cutoff point of five was used to screen for depression and anxiety symptoms.

Statistical analysis

To describe the data, we presented the continuous data as the median and interquartile range (IRQ; 25–75%) and the categorical data as frequency and percentage. All the tests were 2-tailed, and $p < 0.05$ suggested statistically significant. All the statistical analysis was done in R (ver.4.2.0).

Network estimation

We calculated the means and standard deviations (SD) of items in PHQ-9 and GAD-7 *via* the R package “psych”. Items were excluded when the SD was 2.5 times lower than the mean value of the items (21). The function “goldbricker” in the R package “networktools” was used to screen for redundant items.

The distribution of the PHQ-9 and GAD-7 scores was positively skewed. Following previous studies (22, 23), we binarized each item value to the absence (item recorded as 0) and presence (item recorded as 1 or 2 or 3). We applied the Ising model to estimate the depression-anxiety network, which was a popular method for constructing network from psychological binary data (24). It has been widely used in describing the network of depressive and/or anxiety symptoms in different populations (22, 25–27). In the Ising network, the nodes represent PHQ9 and GAD7 items, while the edges represent the independent association between item pairs (i.e., logistic regression coefficients after controlling for the rest variables in the network). To avoid spurious, false-positive edges, the gamma was set at 0.25, which allowed us to retain the most important associations between the variables within the network. The R package “qgraph”, “bootnet”, and “IsingFit” were used to estimate and visualize the network model. Blue edges indicate positive association. Thicker edges represented stronger association.

We calculated the centrality index “expected influence” (EI) to identify the importance of the symptoms in the network (28). Nodes with the highest EI were identified as the central symptoms. We also assessed the predictability of each symptom in the network through the R package “MGM”. Node with high predictability was considered to be easily influenced by its adjacent nodes. Targeting related nodes might be useful to control nodes with high predictability (14). We calculated the bridge expected influence (BEI) index to identify the bridge symptoms of the anxiety-depression network *via* the R package “networktools”. Bridge symptoms were chosen with an 80th percentile BEI threshold (15, 21).

Network accuracy and stability

We employed non-parametric bootstrapping with 1,000 bootstrap samples through the “bootnet” packages to assess the

accuracy of the edge. The case-dropping bootstrap approach was applied to test the stability of BEI and EI (29). The correlation stability coefficient (CS-C) represented the stability of the network. A CS-C higher than 0.5 was considered to be good.

Result

Study sample

Six thousand two hundred eighty Nurses Took Part in the Survey. After Removing Duplicates and Logical Errors (Such as Practicing Year Exceeding age and Wrong Answer in the Trap Question), 6,183 Participants Were Included in the Final Analysis (Table 1). The Median age Was 30 (25, 30), and the Median Practicing Year Was 8 (4, 14) Years. The Majority of the Participants Were Female (6,023, 97%), Had a Bachelor's Degree (4,129.67%), Had a Junior Title (3,764, 60%), and Were Married (4,175, 68%). The Prevalence of

TABLE 1 Sample characteristics.

Characteristic	N = 6,183 ¹
Age, year	30 (26, 36)
Gender	
Female	6,023 (97%)
Male	160 (2.6%)
Education level	
Junior college or below	1,834 (30%)
Bachelor degree	4,129 (67%)
Master degree or above	220 (3.6%)
Partnership	
Single	1,202 (19%)
Partnered	612 (9.9%)
Married	4,175 (68%)
Widowed or divorced	194 (3.1%)
Workplace	
Tertiary hospital	2,397 (39%)
Secondary hospital	1,451 (23%)
Primary hospital	2,335 (38%)
Practicing year, year	8 (4, 14)
Title	
Junior title	3,734 (60%)
Nurse in charge	2,109 (34%)
Chief nurse	340 (5.5%)
GAD7 scores	5 (2, 8)
PHQ9 scores	5 (2, 8)
Anxiety symptom	3,366 (54%)
Depression symptom	3,564 (58%)

¹Median (IQR); n (%).

Depression and Anxiety Symptoms in Our Participants Was 58 and 54%, Respectively.

The network structure of anxiety-depression symptom

No items were excluded for redundancy and low informativeness (Table 2). Figure 1 showed the network structure of anxiety and depression. The density of the network was high (0.88, 106/120), with a mean weight of 0.428. All edges were positive. The strongest edge within the anxiety symptoms was the edge GAD1 (Nervous)—GAD2 (Uncontrollable worry), followed by GAD2 (Uncontrollable worry)—GAD3 (Excessive worry). The strongest edge within the depression symptoms was the edge PHQ1 (Anhedonia)—PHQ2 (Sad mood). PHQ8 (Motor) and GAD5 (Restlessness) showed the strongest association between anxiety and depression symptoms, which was statistically stronger than most of the other edges according to the nonparametric bootstrapping (Figure S1). Table S1 summarized the strength of each edge.

(Trouble relaxing) were the central symptoms with the highest EI. The centrality differs test (Figure S2) showed these nodes were statistically stronger than other nodes in the network. In the depression community, PHQ2 (Sad mood) was the most influential symptom. PHQ3 (Sleep) and PHQ5 (Appetite) held the lowest EI, suggesting they might be marginal symptoms. The mean predictability was 0.55, implying that half of the variation might be explained by its neighbors (Table 2). The predictability of GAD2 (Uncontrollable worry) was highest (0.72), while PHQ9 (Death) held the lowest predictability (0.26).

The bridge expected influence index (Figure 3) indicated that GAD5 (Restlessness), GAD1 (Nervous), and PHQ9 (Death) were the bridge symptoms that drove the comorbid depression and anxiety symptoms. The correlation matrix of PHQ9 and GAD7 items were presented in Table S1. The strongest association between anxiety symptoms and depression symptoms lies in GAD5 (Restlessness) and PHQ8 (Motor), followed by GAD7 (Feeling afraid) and PHQ9 (Death), and GAD1 (Nervous) and PHQ2 (Sad mood).

Network stability and accuracy

The anxiety-depression network showed excellent stability. The CS-C of node EI was 0.75, implying the EI was still correlated with the original data ($r = 0.75$) after dropping out 75% of the data (Figure 4). The CS-C of BEI was 0.672,

Central symptoms and bridge symptoms

The centrality plot (Figure 2) suggested that GAD5 (Restlessness), GAD2 (Uncontrollable worry), and GAD4

TABLE 2 Descriptive statistics of the PHQ-9 and GAD-7 items.

Items	Item content	Mean	SD	Presence ¹	Absence ²	Expected influence ³	Predictability
PHQ1	Anhedonia	0.95	0.74	4,535 (73%)	1,648 (27%)	−0.55	0.50
PHQ2	Sad mood	0.86	0.69	4,223 (68%)	1,960 (32%)	0.86	0.56
PHQ3	Sleep	1.10	0.89	4,446 (72%)	1,737 (28%)	−2.07	0.38
PHQ4	Fatigue	1.15	0.80	4,884 (79%)	1,299 (21%)	−0.11	0.47
PHQ5	Appetite	0.80	0.80	3,632 (59%)	2,551 (41%)	−1.76	0.47
PHQ6	Worthless	0.72	0.79	3,285 (53%)	2,898 (47%)	−0.05	0.61
PHQ7	Concentration	0.70	0.79	3,076 (50%)	3,107 (50%)	−0.80	0.60
PHQ8	Motor	0.44	0.67	2,154 (35%)	4,029 (65%)	0.37	0.53
PHQ9	Death	0.28	0.56	1,365 (22%)	4,818 (78%)	−0.73	0.26
GAD1	Nervous	0.88	0.74	4,082 (66%)	2,101 (34%)	0.74	0.61
GAD2	Uncontrollable worry	0.69	0.78	3,115 (50%)	3,068 (50%)	1.34	0.72
GAD3	Excessive worry	0.91	0.80	4,059 (66%)	2,124 (34%)	0.25	0.59
GAD4	Trouble relaxing	0.75	0.78	3,484 (50%)	2,699 (50%)	0.95	0.69
GAD5	Restlessness	0.44	0.65	2,237 (36%)	3,946 (64%)	1.39	0.61
GAD6	Irritability	0.92	0.79	4,166 (67%)	2,017 (33%)	0.08	0.54
GAD7	Feeling afraid	0.51	0.70	2,501 (40%)	3,682 (60%)	0.08	0.59

¹ n (%); Item Recorded as 1 or 2 or 3 was considered to be “presence”.

² n (%); Item recorded as 0 was considered to be “absence”.

³ Raw data from the depression-anxiety network.

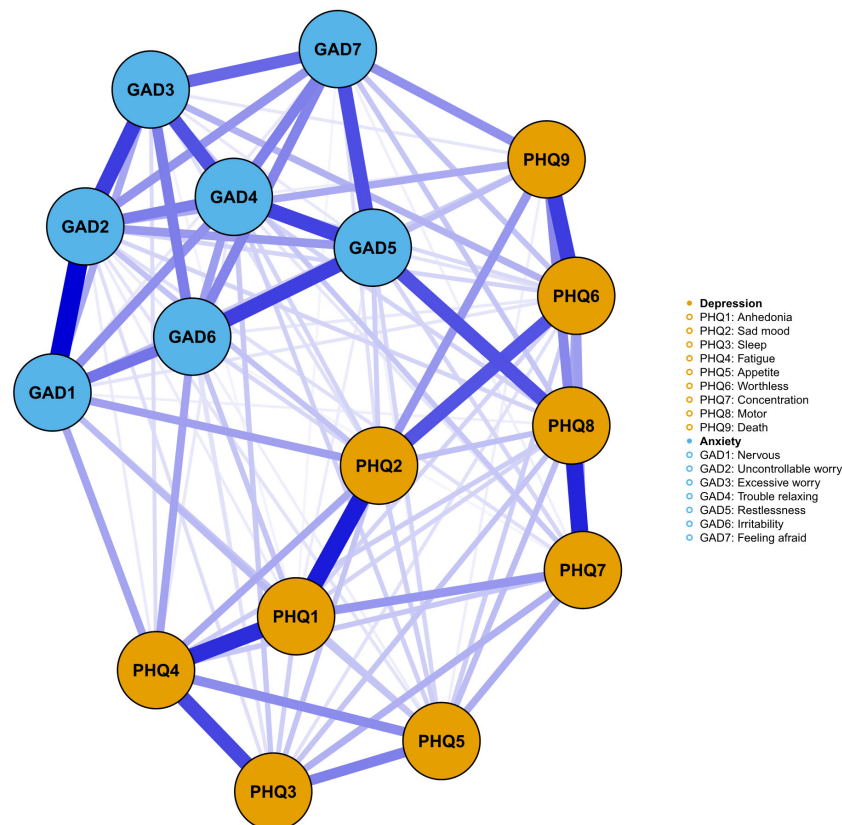


FIGURE 1

The network of anxiety-depression symptoms. Orange nodes represented the depression symptoms, while blue nodes represented the anxiety symptoms. The thickness of the edges represented the strength of the association between two nodes, with higher thickness indicating stronger relationship.

which was also very good. Figure 5 showed the result of the nonparametric bootstrap procedure. The bootstrapped 95% CIs were narrow, indicating high accuracy.

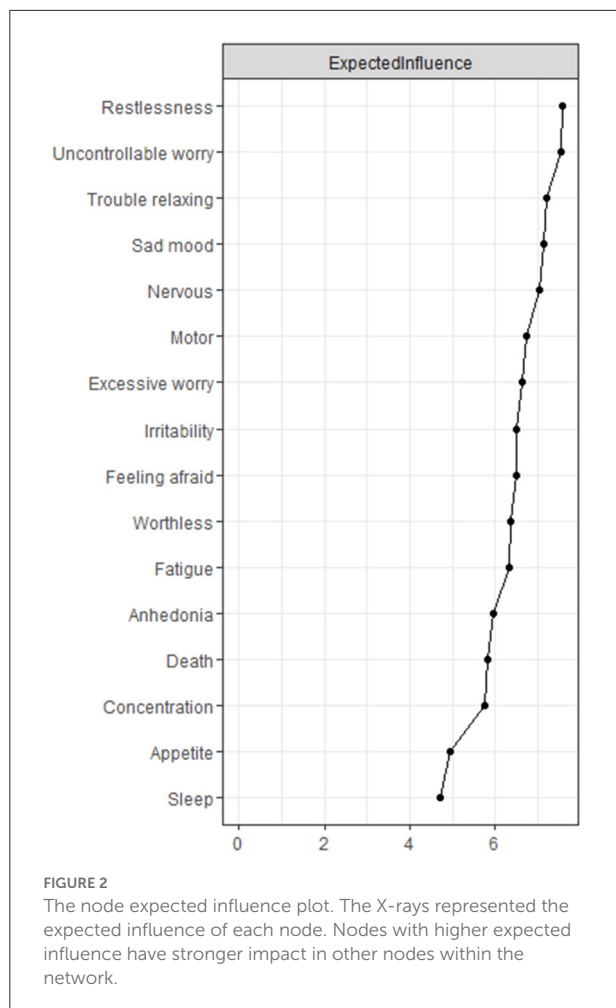
Discussion

To our knowledge, it is the first study to describe the network of anxiety and depression symptoms among nurses in the late stage of the COVID-19 pandemic. The central symptom of the anxiety-depression network was restlessness, uncontrollable worry, trouble relaxing, and sad mood. Restlessness, nervous, and suicidal thoughts served as bridge symptoms linking anxiety and depression.

We found that GAD5 (Restlessness) was the most central symptom in the anxiety-depression network. It was positively associated with all anxiety symptoms and depression symptoms except PHQ4 (Fatigue) and PHQ3 (Sleep). Besides, other psychomotor symptoms such as GAD4 (Trouble relaxing) and PHQ8 (Motor) also displayed high EI. The high influence of psychomotor symptoms in the anxiety-depression network was

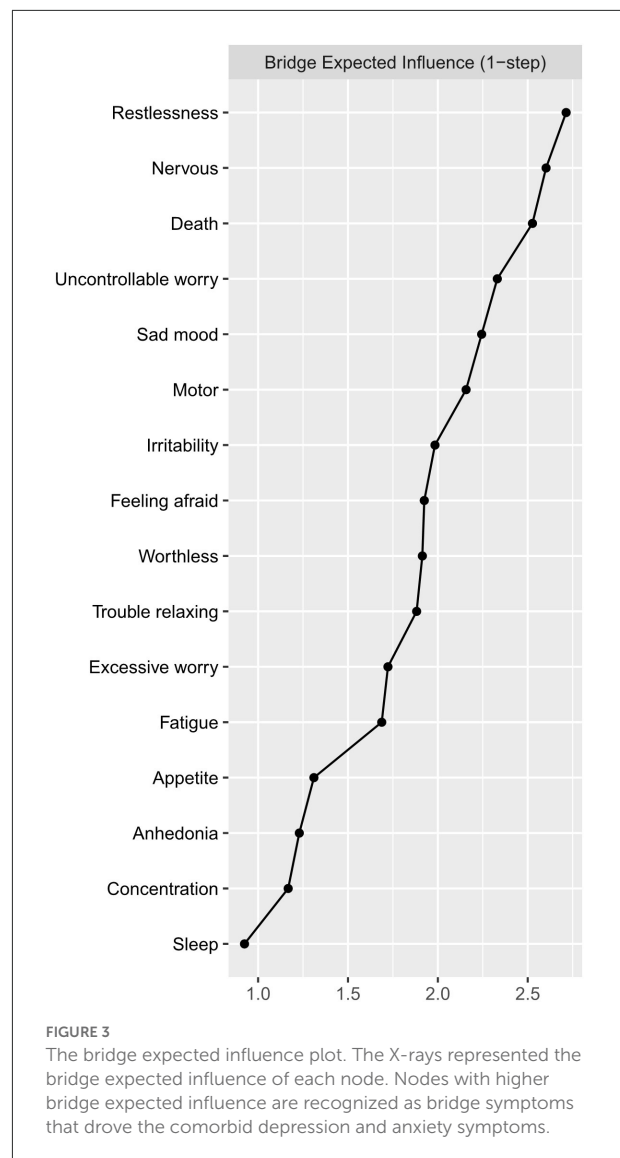
consistently reported by numerous studies among the different populations across the world during the pandemic (16, 25, 31–34), which might result from the restriction on social and recreational activities due to the COVID-19 pandemic. Previous studies found psychomotor symptoms emerged as central symptoms during the peak of the pandemic when there was a strict motivation restriction, and showed remission when the restriction was relaxed (31). A longitudinal study also indicated psychomotor symptoms served as central symptoms during the pandemic period rather than the pre-pandemic period (32). Although the nationwide lockdown was ended in China when we conducted this study, nurses might decrease outdoor activities due to the busy work and the social distancing policy, which led to the high centrality of psychomotor symptoms. Similar findings were reported in Chinese clinicians during the late stage of the pandemic, suggesting the psychomotor symptoms might be the hallmark of the depression and anxiety symptoms of healthcare workers in this period, which warranted further attention (17).

GAD5 (Restlessness) was also the bridge symptom in this population, which implied that targeting restlessness



was of great clinical value in treating both depression and anxiety disorders. The inter-connection between GAD5 (Restlessness) and PHQ8 (Motor) was the most robust transdiagnostic edge within the network of depression and anxiety symptoms. The transdiagnostic characteristic of restlessness was validated in both clinical (30) and community samples (16, 31, 33, 35) via the network model in previous studies. A longitudinal study provided more direct evidence, which found restlessness predicted subsequent relapse of major depressive disorder (MDD) (36). Also, early improvement of restlessness symptoms was positively associated with remission of MDD, suggesting the potential effectiveness of targeting restlessness in treating MDD (37).

PHQ2 (Sad mood) and GAD2 (Uncontrollable worry) were also central symptoms in the network. This finding supported the current status of the two symptoms as core and necessary symptoms required for the diagnosis of generalized anxiety disorder (GAD) and MDD (38, 39). Similar results were reported in different populations both before and after



the breakout of the pandemic (15, 30, 40–42). In addition to restlessness, GAD1 (Nervous) showed high BEI, implying itself as a bridge symptom. Surprisingly, PHQ9 (Death) was another bridge symptom within the network, which has not been reported in previous studies. It exhibited a positive relationship with all anxiety symptoms and was tightly associated with GAD2 (Uncontrollable worry), GAD5 (Restlessness), and GAD7 (Feeling afraid). Further studies are in need to identify the relationship between anxiety and suicidal thoughts at a symptom level.

Interestingly, our study demonstrated the prominence of anxiety symptoms within the depression-anxiety network. The most central symptoms and bridge symptoms belonged to the anxiety communities, indicating that anxiety symptoms were vital in triggering and maintaining the

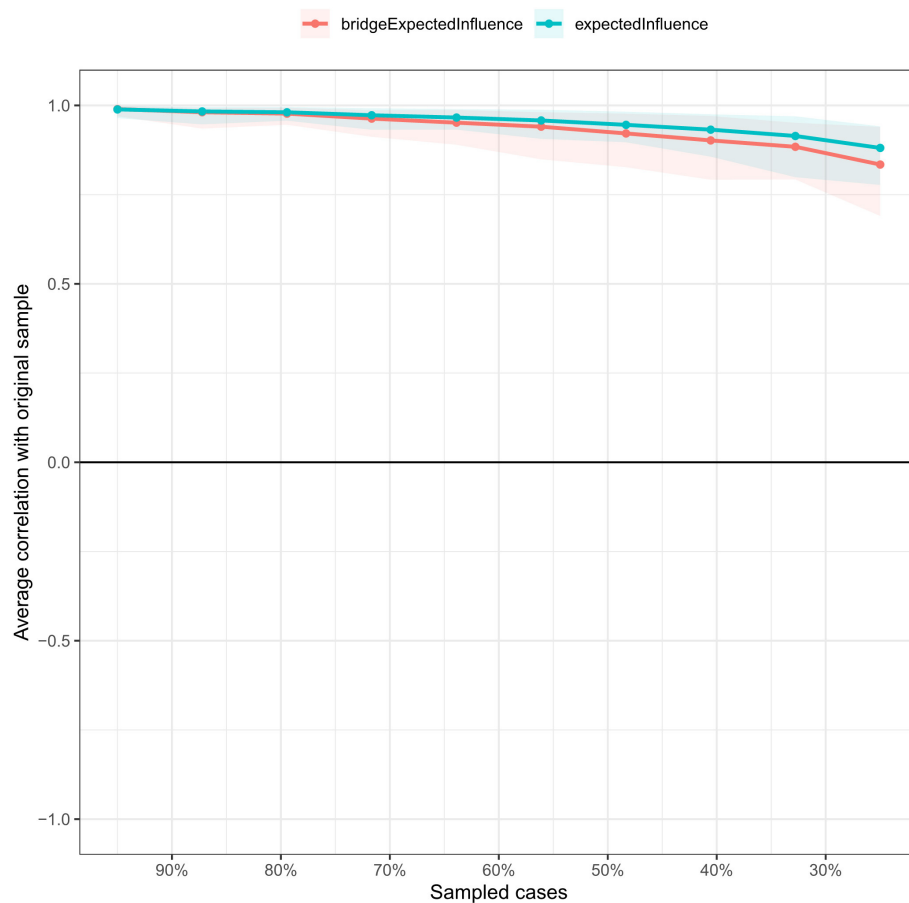


FIGURE 4

The stability of the depression-anxiety network. The stability of central and bridge expected influence by case-dropping bootstrap. The CS-C for the node and bridge expected influence was 0.672 and 0.75, respectively.

depression-anxiety network among nurses. The fear and uncertainty of the recurrent emergence of the pandemic might account for this phenomenon (43, 44). Taken together, our results indicated the need for monitoring and intervening in several specific anxiety symptoms in the nursing population.

Our study had several clinical implications. First, the prevalence of depression (58%) and anxiety (54%) symptoms were high in the late stage of the pandemic. Timely screening and mental health intervention are in need. Second, we found restlessness served as the most central symptom and bridge symptoms across the anxiety-depression network. Our findings highlighted the priority of treating restlessness and related psychomotor symptoms in nurses. Targeted intervention on psychomotor symptoms such as improving physical activities and mindfulness-based approaches might be helpful in this population (30).

Limitation

There were several limitations in our study. First, the cross-sectional study design didn't permit causal inferences. Second, we didn't assess the depression-anxiety network of our participants before the pandemic. Several important COVID-19 related information such as the history of COVID-19 infection, vaccine, and frontline experience were not collected. Hence, we could not directly evaluate the impact of the pandemic on depression and anxiety at a symptom level. Third, despite the large sample size, the use of convenience sampling might influence the representativeness of our samples. The majority of the participants were female, which might impact the generalizability of our results. Fourth, we used a self-administrated questionnaire rather than a clinical diagnostic interview. Fifth, depression and anxiety symptoms are highly associated with substance usage and medical or psychiatric

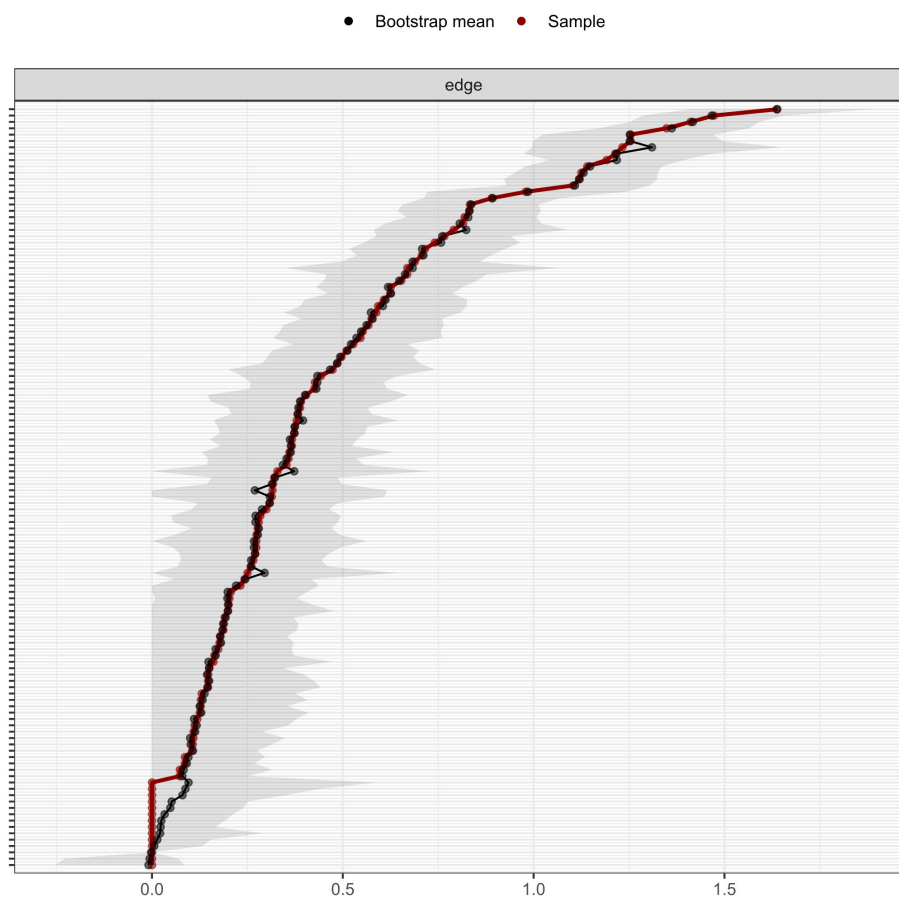


FIGURE 5

The accuracy of the network edges by non-parametric bootstrapping. The gray area represents the bootstrap 95% confidence interval.

illness, which we did not collect in the present study. Further studies are in need to determine how these factors impact the depression-anxiety network in the nursing population, which might provide valuable insights into the prevention and treatment of anxiety and depression in nurses.

Conclusion

In conclusion, our study assessed the network structure of anxiety and depression symptoms among a large sample of nurses in the late stage of the COVID-19 pandemic. Restlessness emerged as both the strongest central symptom and bridge symptom in this network. Other central symptoms included uncontrollable worry, trouble relaxing, and sad mood. These key symptoms, especially psychomotor symptoms might hold great promise in the prevention and treatment of anxiety and depression in the nursing population.

Data availability statement

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

Ethics statement

The studies involving human participants were reviewed and approved by the Ethics Committee of the Second Xiangya Hospital of Central South University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

TL and QWu contributed to all aspects of the study. YLia, JT, JL, and CQ contributed to the study design. QY, PP, XW, and YH contributed to the statistical analysis. PP, YiW, MLi, and

YM contributed to the drafting of the original manuscript. QC, YLiu, SC, MLia, ZL, HX, LH, and QW contributed to the survey development and data acquisition. All authors contributed to the article and approved the submitted version.

Funding

This study was supported by the Natural Science Foundation of Hunan Province (Grant No. 2020JJ4795 to TL).

Acknowledgments

We show greatest gratitude to all the participants.

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/fpubh.2022.996386/full#supplementary-material>

References

- Al Maqbali M, Al Sinani M, Al-Lenjawi B. Prevalence of stress, depression, anxiety and sleep disturbance among nurses during the COVID-19 pandemic: a systematic review and meta-analysis. *J Psychosom Res.* (2021) 141:110343. doi: 10.1016/j.jpsychores.2020.110343
- Hou H, Pei Y, Yang Y, Lu L, Yan W, Gao X, et al. Factors associated with turnover intention among healthcare workers during the coronavirus disease 2019 (COVID-19) pandemic in China. *Risk Manag Healthc Policy.* (2021) 14:4953–65. doi: 10.2147/RMHP.S318106
- An Y, Yang Y, Wang A, Li Y, Zhang Q, Cheung T, et al. Prevalence of depression and its impact on quality of life among frontline nurses in emergency departments during the COVID-19 outbreak. *J Affect Disord.* (2020) 276:312–5. doi: 10.1016/j.jad.2020.06.047
- Ausín B, González-Sanguino C, Castellanos MA, Sáiz J, Zamorano S, Vaquero C, et al. The psychological impact of the COVID-19 pandemic in Spain: a longitudinal study. *Psicothema.* (2022) 34:66–73. doi: 10.7334/psicothema2021.290
- MacDonald JJ, Baxter-King R, Vavreck L, Naeim A, Wenger N, Sepucha K, et al. Depressive symptoms and anxiety during the COVID-19 pandemic: large, longitudinal, cross-sectional survey. *JMIR Ment Health.* (2022) 9:e33585. doi: 10.2196/33585
- Li Y, Zhao J, Ma Z, McReynolds LS, Lin D, Chen Z, et al. Mental health among college students during the COVID-19 pandemic in China: a 2-wave longitudinal survey. *J Affect Disord.* (2021) 281:597–604. doi: 10.1016/j.jad.2020.11.109
- Alonso J, Vilagut G, Alayo I, Ferrer M, Amigo F, Aragón-Peña A, et al. Mental impact of Covid-19 among Spanish healthcare workers. A large longitudinal survey. *Epidemiol Psychiatr Sci.* (2022) 31:e28. doi: 10.1017/S2045796022000130
- Zhang R, Lai J, Wang Y, Huang J, Hu S, Wang H. Mental health outcome and resilience among aiding Wuhan nurses: one year after the COVID-19 outbreak in China. *J Affect Disord.* (2022) 297:348–52. doi: 10.1016/j.jad.2021.10.050
- Fried EI, Nesse RM. Depression sum-scores don't add up: why analyzing specific depression symptoms is essential. *BMC Med.* (2015) 13:72. doi: 10.1186/s12916-015-0325-4
- Fonseca-Pedrero E. Network analysis: A new way of understanding psychopathology? *Revista de Psiquiatría y Salud Mental.* (2017) 10:206–15. doi: 10.1016/j.rpsmen.2017.10.005
- Borsboom D, Cramer AOJ. Network analysis: an integrative approach to the structure of psychopathology. *Ann Rev Clin Psychol.* (2013) 9:91–121. doi: 10.1146/annurev-clinpsy-050212-185608
- Jones PJ, Ma R, McNally RJ. Bridge centrality: a network approach to understanding comorbidity. *Multivariate Behav Res.* (2021) 56:353–67. doi: 10.1080/00273171.2019.1614898
- Abdul Karim M, Ouanes S, Reagu SM, Alabdulla M. Network analysis of anxiety and depressive symptoms among quarantined individuals: cross-sectional study. *BJPsych Open.* (2021) 7:e222. doi: 10.1192/bjo.2021.1060
- Ren L, Wang Y, Wu L, Wei Z, Cui L-B, Wei X, et al. Network structure of depression and anxiety symptoms in Chinese female nursing students. *BMC Psychiatry.* (2021) 21:279. doi: 10.1186/s12888-021-03276-1
- Cai H, Bai W, Liu H, Chen X, Qi H, Liu R, et al. Network analysis of depressive and anxiety symptoms in adolescents during the later stage of the COVID-19 pandemic. *Transl Psychiatry.* (2022) 12:98. doi: 10.1038/s41398-022-01838-9
- Bai W, Cai H, Liu S, Chen X, Sha S, Cheung T, et al. Anxiety and depressive symptoms in college students during the late stage of the COVID-19 outbreak: a network approach. *Transl Psychiatry.* (2021) 11:638. doi: 10.1038/s41398-021-01738-4
- Jin Y, Sha S, Tian T, Wang Q, Liang S, Wang Z, et al. Network analysis of comorbid depression and anxiety and their association with quality of life among clinicians in public hospitals during the late stage of the COVID-19 pandemic in China. *J Affect Disord.* (2022) 314:193–200. doi: 10.1016/j.jad.2022.06.051
- Mukaigawara M, Hassan I, Fernandes G, King L, Patel J, Sridhar D. An equitable roadmap for ending the COVID-19 pandemic. *Nat Med.* (2022) 28:893–6. doi: 10.1038/s41591-022-01787-2
- Zhang W-R, Wang K, Yin L, Zhao W-F, Xue Q, Peng M, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom.* (2020) 89:242–50. doi: 10.1159/000507639
- Liu Y, Chen H, Zhang N, Wang X, Fan Q, Zhang Y, et al. Anxiety and depression symptoms of medical staff under COVID-19 epidemic in China. *J Affect Disord.* (2021) 278:144–8. doi: 10.1016/j.jad.2020.09.004
- Bai W, Xi H-T, Zhu Q, Ji M, Zhang H, Yang B-X, et al. Network analysis of anxiety and depressive symptoms among nursing students during the COVID-19 pandemic. *J Affect Disord.* (2021) 294:753–60. doi: 10.1016/j.jad.2021.07.072
- Kim D, Kwon H-J, Ha M, Lim MH, Kim KM. Network analysis for the symptom of depression with Children's depression Inventory in a large sample of school-aged children. *J Affect Disord.* (2021) 281:256–63. doi: 10.1016/j.jad.2020.12.002

23. Cheung T, Jin Y, Lam S, Su Z, Hall BJ, Xiang Y-T. International Research Collaboration on COVID-19. Network analysis of depressive symptoms in Hong Kong residents during the COVID-19 pandemic. *Transl Psychiatry*. (2021) 11:460. doi: 10.1038/s41398-021-01543-z
24. van Borkulo CD, Borsboom D, Epskamp S, Blanken TF, Boschloo L, Schoevers RA, et al. new method for constructing networks from binary data. *Sci Rep*. (2014) 4:5918. doi: 10.1038/srep05918
25. Zavlis O, Butter S, Bennett K, Hartman TK, Hyland P, Mason L, et al. How does the COVID-19 pandemic impact on population mental health? A network analysis of COVID influences on depression, anxiety and traumatic stress in the UK population. *Psychol Med*. (2021). doi: 10.1017/S0033291721000635. [Epub ahead of print].
26. Fonseca-Pedrero E, Muñiz J, Gacía-Portilla MP, Bobes J. Network structure of psychotic-like experiences in adolescents: links with risk and protective factors. *Early Interv Psychiatry*. (2021) 15:595–605. doi: 10.1111/eip.12989
27. Kendler KS, Aggen SH, Flint J, Borsboom D, Fried EI. The centrality of DSM and non-DSM depressive symptoms in Han Chinese women with major depression. *J Affect Disord*. (2018) 227:739–44. doi: 10.1016/j.jad.2017.11.032
28. Burger J, Isvoranu A-M, Lunansky G, Haslbeck JMB, Epskamp S, Hoekstra RHA, Fried EI, Borsboom D, Blanken TF. Reporting standards for psychological network analyses in cross-sectional data. *Psychol. Methods*. (2022). 227:739U44. doi: 10.1037/met0000471
29. Epskamp S, Borsboom D, Fried EI. Estimating psychological networks and their accuracy: A tutorial paper. *Behav Res*. (2018) 50:195–212. doi: 10.3758/s13428-017-0862-1
30. Kaiser T, Herzog P, Voderholzer U, Brakemeier E. Unraveling the comorbidity of depression and anxiety in a large inpatient sample: network analysis to examine bridge symptoms. *Depress Anxiety*. (2021) 38:307–17. doi: 10.1002/da.23136
31. Wang Y, Hu Z, Feng Y, Wilson A, Chen R. Changes in network centrality of psychopathology symptoms between the COVID-19 outbreak and after peak. *Mol Psychiatry*. (2020) 25:3140–9. doi: 10.1038/s41380-020-00881-6
32. Ge F, Zheng A, Wan M, Luo G, Zhang J. Psychological state among the general chinese population before and during the COVID-19 epidemic: a network analysis. *Front. Psychiatry*. (2021) 12:591656. doi: 10.3389/fpsy.2021.591656
33. Hoffart A, Johnson SU, Ebrahimi OV. The network of stress-related states and depression and anxiety symptoms during the COVID-19 lockdown. *J Affect Disord*. (2021) 294:671–8. doi: 10.1016/j.jad.2021.07.019
34. Owczarek M, Nolan E, Shevlin M, Butter S, Karatzias T, McBride O, et al. How is loneliness related to anxiety and depression: a population-based network analysis in the early lockdown period. *Int J Psychol*. (2022). doi: 10.1002/ijop.12851
35. Yang Y, Sun H, Luo X, Li W, Yang F, Xu W, et al. Network connectivity between fear of cancer recurrence, anxiety, and depression in breast cancer patients. *J Affect Disord*. (2022) 309:358–67. doi: 10.1016/j.jad.2022.04.119
36. Sakurai H, Suzuki T, Yoshimura K, Mimura M, Uchida H. Predicting relapse with individual residual symptoms in major depressive disorder: a reanalysis of the STAR*D data. *Psychopharmacology*. (2017) 234:2453–61. doi: 10.1007/s00213-017-4634-5
37. Sakurai H, Uchida H, Abe T, Nakajima S, Suzuki T, Pollock BG, et al. Trajectories of individual symptoms in remitters versus non-remitters with depression. *J Affect Disord*. (2013) 151:506–13. doi: 10.1016/j.jad.2013.06.035
38. Belmaker RH, Agam G. Major depressive disorder. *N Engl J Med*. (2008) 358:55–68. doi: 10.1056/NEJMra073096
39. DeMartini J, Patel G, Fancher TL. Generalized anxiety disorder. *Ann Int Med*. (2019) 170:ITC49–ITC64. doi: 10.7326/AITC201904020
40. Beard C, Millner AJ, Forgeard MJC, Fried EI, Hsu KJ, Treadway M, et al. Network analysis of depression and anxiety symptom relations in a psychiatric sample. *Psychol Med*. (2016) 46:3359–69. doi: 10.1017/S0033291716002300
41. Malgaroli M, Calderon A, Bonanno GA. Networks of major depressive disorder: a systematic review. *Clin Psychol Rev*. (2021) 85:102000. doi: 10.1016/j.cpr.2021.102000
42. Peel AJ, Armour C, Buckman JEJ, Coleman JRI, Curzons SCB, Davies MR, et al. Comparison of depression and anxiety symptom networks in reporters and non-reporters of lifetime trauma in two samples of differing severity. *J Affect Disord Rep*. (2021) 6:100201. doi: 10.1016/j.jadr.2021.100201
43. Costa M de A, Kristensen CH, Dreher CB, Manfro GG, Salum GA. Habituating to pandemic anxiety: Temporal trends of COVID-19 anxiety over sixteen months of COVID-19. *J Affect Disord*. (2022) 313:32–5. doi: 10.1016/j.jad.2022.06.077
44. Grupe DW, Nitschke JB. Uncertainty and anticipation in anxiety: an integrated neurobiological and psychological perspective. *Nat Rev Neurosci*. (2013) 14:488–501. doi: 10.1038/nrn3524



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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

RECEIVED 13 September 2022

ACCEPTED 24 October 2022

PUBLISHED 10 November 2022

CITATION

Ding C, Wang L, Guo Z, Chen Y and
Jin J (2022) Psychological care needs
for frontline nurses during the
COVID-19 pandemic: A qualitative
study.
Front. Public Health 10:1043515.
doi: 10.3389/fpubh.2022.1043515

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Psychological care needs for frontline nurses during the COVID-19 pandemic: A qualitative study

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Background: In the course of the COVID-19 pandemic, nurses have played vital roles in clinical treatment. Their success in providing adequate care services depends on their psychological state, which determines their physical health, work status, therapeutic outcomes, and response to public health emergencies. However, a limited number of studies have evaluated psychological care needs from the perspective of nurses. This study aimed to describe the psychological care needs for frontline nurses in the course of the COVID-19 pandemic.

Methods: This was a qualitative descriptive study. Data were collected through semi-structured in-depth interviews with 15 frontline nurses who had been involved in the care of COVID-19 positive patients during the COVID-19 pandemic, and received psychological care. The conventional content analysis was used to identify themes from the interview transcripts.

Results: Four major themes about the psychological care needs of frontline nurses were identified: (1) psychological service providers (categories: professional service team, trustworthy person or group, ability to empathize with nurses); (2) problems with psychological care (categories: lack of universal screening and focused attention, online group counseling lacks targeting, psychological interventions lack individualization); (3) psychological care content (categories: mental health-related education, recognition of nurses' contributions, problem-solving therapy, psychological counseling and venting); (4) organization and management of psychological services (categories: focus on the psychological care needs of frontline nurses, build a standardized psychological service process system).

Conclusion: It is important to understand individual psychological care needs of frontline nurses and to provide them with tailor-made psychological care that meet their needs. This will improve their mental health, promote clinical care and quality responses to public health emergencies.

KEYWORDS

COVID-19, nurses, psychological care, needs, qualitative research

Introduction

The COVID-19 pandemic has exerted major challenges to health care systems around the world, and caused major psychological and physical shocks to people. Nurses have played a vital role in the treatment of COVID-19. However, due to the heavy workload, extreme physical labor, high risk of infection, fear of family transmission, loss of patients and colleagues, as well as long-term isolation from family members and other reasons, they are more likely to exhibit higher degrees of psychological distress (1–4).

In the clinical environment, contact time between nurses and patients is longer, the frequency of physical contact is higher, which increases the possibility of cross-transmission (1). Due to the long exposure time of frontline nurses, they are more likely to exhibit varying degrees of mental disorders (5). Studies had shown that in the early stages of the COVID-19 pandemic, the prevalence of depression, anxiety and sleep disorders among frontline medical staff was 50.4, 44.6, and 34.0%, respectively. Other psychological distress associated symptoms were as high as 71.5% (3).

Previous studies had shown that, in clinical work, nurses bear the greatest psychological pressure (6), experience higher levels of anxiety (7), are more likely to develop post-traumatic stress disorders (PTSD) (8), and exhibit higher incidences of depression (9), with 6.5% of the nurses expressing suicidal ideas (2). These mental health disorders affect the attention, understanding, decision-making ability, work performance as well as long-term overall health of nurses (2, 10, 11). The decline in nurses' mental and physical health conditions seriously impacted on the performance of their duties and negatively affects health care performance (12–14). These factors have a direct effect on the health of patients since nurses with mental health problems may be less involved in patient interactions, and make more medical errors, etc., which may damage the clinical outcomes of patients (15–18).

Since nurses play an important role in preventing and controlling infections as well as curbing public health incidents, maintaining their mental health is of great significance to controlling infectious diseases (10, 19). Therefore, it is important to describe the psychological care needs of nurses. Studies have reported that attention should be paid to the special psychological care needs of frontline nurses, and that they should be given tailor-made psychological care services (20–22). Rajkumar (23) highlight that time-limited and culturally sensitive mental health interventions tailored to frontline nurses should be developed. However, few studies have delved into determining what kind of psychological care frontline nurses need, and whether the psychological services they receive fully meet their expectations. A survey in Wuhan showed that 3,556 (75.8%) nurses believed that it is necessary to regularly participate in individual or group

consultations during the outbreak, while 363 (7.7%) nurses said they needed the help of mental health professionals (2). Another study used a questionnaire survey to determine the psychological care content that nurses are most interested in, the psychological resources most anticipated, and who the participants hoped to receive mental care from Kang et al. (10). These studies are limited by the fact that they adopted structured questionnaire surveys, and they did not involve frontline nurses who could have been better placed to use their language and experience to express their individual views on the need for psychological services. Nekooei Moghaddam et al. (24) conducted interviews with 23 disaster relief nurses who had overseen an earthquake rescue mission. These nurses mentioned the need for psychological care. They needed someone to talk to and accompany them, to tell them if they had any psychological problems, to know their existence and to maintain a good mental state.

Previous studies have not specifically explored the psychological care needs for frontline nurses in China or other countries. This study was designed to explore the psychological service needs of nursing staff directly from frontline nurses during the COVID-19 pandemic using qualitative interviews to listen and understand the anxiety and distress experienced by frontline nurses during the COVID-19 pandemic, and to provide suggestions and references for providing individualized psychological services to nurses.

Materials and methods

Study design

To better understand the psychological care needs for frontline nurses in the course of the COVID-19 pandemic, this study used a qualitative descriptive approach with a constructionist epistemology to provide comprehensive information about an event (25). This epistemology acknowledges that knowledge is constructed from an individual's perception and experiences, and constructed via speech to understand the world (26). Our study adopted this epistemology as meanings can emerge from the active engagement of the researcher with the participant through a bidirectional understanding of the experience relationship, where language is viewed as implicit in the social production and reproduction of both meaning and experience (27). The study was reported according to the COREQ guidelines (28) for qualitative studies (Supplementary File 1).

Participants

Purposive sampling and maximum difference sampling strategies were used (29). Differences were reflected in education

level, age, gender, marriage, working years, etc. These frontline clinical nurses were selected during the COVID-19 pandemic at a tertiary hospital in Wuhan, China. The inclusion criteria were: (a) practicing nurses with a nurse practitioner qualification certificate; (b) working at fever clinics, isolation wards, or square cabin hospitals, and caring of COVID-19 positive patients during the pandemic; (c) receiving various psychological care services during the pandemic, including psychosocial counseling groups and hospital psychological care team. The psychosocial counseling groups are composed of professional psychologists, including experts with experience in post-disaster psychological crisis intervention and mental health experts. The hospital psychological care team is composed of nurses with psychological counseling qualifications from various departments. The team members perform routine clinical nursing work in each department. When nurses have psychological problems, they seek help from the psychological care team members of their department, referred to as mental health nurses.

Data collection

Data collection by CD and LW. Before the start of the formal interview, nurses who met the sampling criteria were contacted in advance. We gave them the relevant information regarding the study, established friendly relations, and agreed with them about the time, place, and method of the interview. After conducting semi-structured interviews with 15 participants, the data reached saturation. Among them, five participants chose face-to-face interviews while 10 of them chose telephone interviews. None dropped out of the study. The initial interview outline was formulated after systematically reviewing the literature and consulting experts. The final interview outline was established after performing a pilot-interview with 3 respondents, and they were not included among the 15 participants. The final semi-structured interview guide consisted of six open-ended questions aimed at exploring the psychological care they received during the COVID-19 pandemic and their need for psychological care services. (a) How did you seek for psychological help during the epidemic? Can you give some examples of this? (b) What kind of psychological services did you receive from your hospital during the epidemic? (c) What do you think of these psychological services? Do these psychological services help you get out of stress? (d) What do you hope to do to improve psychological care services in public health emergencies? Do you have some good advice? (e) Do you think there are other ways to provide you with psychological help? Please give examples (f) Apart from that, what else do you need to add about psychological care?

Face-to-face interviews were conducted in a hospital environment that was familiar to nurses, in a quiet and undisturbed nurse's lounge, with only the interviewer and interviewee present. The telephone interview was conducted

in a quiet room with a good network communication signal. All interviews lasted 40 to 60 min. During the interviews, a combination of simultaneous recording and note recording were used.

Data analysis

After each interview, the audio recordings were transcribed into verbatim word by word transcripts within 24 h. Data analysis and data collection were conducted simultaneously. Using the qualitative data analysis software NVivo 12 (QSR International Pty Ltd) performed the conventional content analysis by two researchers. Coders (CD and LW) first read the entire transcripts of each participant's interviews several times to obtain an overall understanding of the study phenomenon. Afterwards, the coders hand coded any narrative data related to the participant's psychological care needs on a line-by-line basis. Then, we abstracted meaning units based on the latent meanings behind them via a coding process and developed categories through the comparison of the codes in terms of similarities and differences. The coding of individual transcripts was discussed between the two coders and repeatedly tweaked the ambiguous code fragments until an agreement was reached. The comparison of the categories and reflection on the latent meaning of the data led to the development of some themes.

Based on the coded data, a theme matrix has been constructed. The quotations for each theme were extracted and used to present the participants' expressions of the theme, to facilitate our understanding of the specific meaning of the theme, and to enrich our findings and make them more socially relevant.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of Union Hospital, Tongji Medical College, Huazhong University of Science and Technology (IRB number: 2021S003). Before the interview, participants were informed of the purpose of the study, after which they were required to provide an oral or written consent. Participants were also informed about the privacy of their contributions and their right to withdraw from the study at any given time. Simultaneously, we code-converted interviewee's name and concealed information that could identify them.

Results

A total of 15 nurses participated in interviews, including 3 males and 12 females, with an average age of 33 years and an average working experience of 11.4 years were recruited,

TABLE 1 Participants' characteristics (n = 15).

Characteristics	Means (SD)/F (%) [*]
Age (years)	33 (5.03)
Gender	
Male	3 (20.0)
Female	12 (80.0)
Marriage	
Married	11 (73.3)
Unmarried	4 (26.7)
Highest educational level	
Bachelor's degree	11 (73.3)
Master's degree	4 (26.7)
Professional title	
Nurse practitioner	6 (40.0)
Nurse in charge	9 (60.0)
Work experience (years)	
2–5	2 (13.3)
6–10	5 (33.3)
11–15	6 (40.0)
More than 15	2 (13.3)
Specialty	
Chronic care	4 (26.7)
Surgical care	5 (33.3)
Intensive care	3 (20.0)
Outpatient and emergency	3 (20.0)

^{*} SD, standard deviation; F, frequency.

and sociodemographic characteristics are shown in Table 1. In this study, the analyses revealed 184 codes and four themes: psychological service providers, problems with psychological care, psychological care content, organization and management of psychological services. The themes and categories are shown in Figure 1.

Psychological service providers

Professional service team

Some participants were of the opinion that the psychological care services they received were not professional enough and they hoped that the professional team would provide them with professional psychological care. At the same time, participants who received psychological care provided by the mental health nurses of our hospital and services provided by psychologists were of the opinion that there was a difference in care and were eager to receive more professional care services. They also opined that nurses with more serious psychological problems need more professional care services from psychologists. Moreover, nurses felt at ease if there

were professionals with expertise on pandemic prevention and control in the psychological care team.

"I think that the professional guidance they (mental health nurse) give is not professional enough, at least it can't achieve the desired effect so that people can psychologically relax... It is necessary to have the relevant professional experience because I find that services provided by professional and non-professional individuals are very different" (Interviewee 12, Age:27, Male)

"Maybe, it would be better for external professional staff to provide guidance... However, the hospital psychological care team should include some psychological experts, and for the teams aimed at controlling this pandemic, there must be at least two experts on epidemic prevention and control" (Interviewee 15, Age:39, Female)

Trustworthy person or group

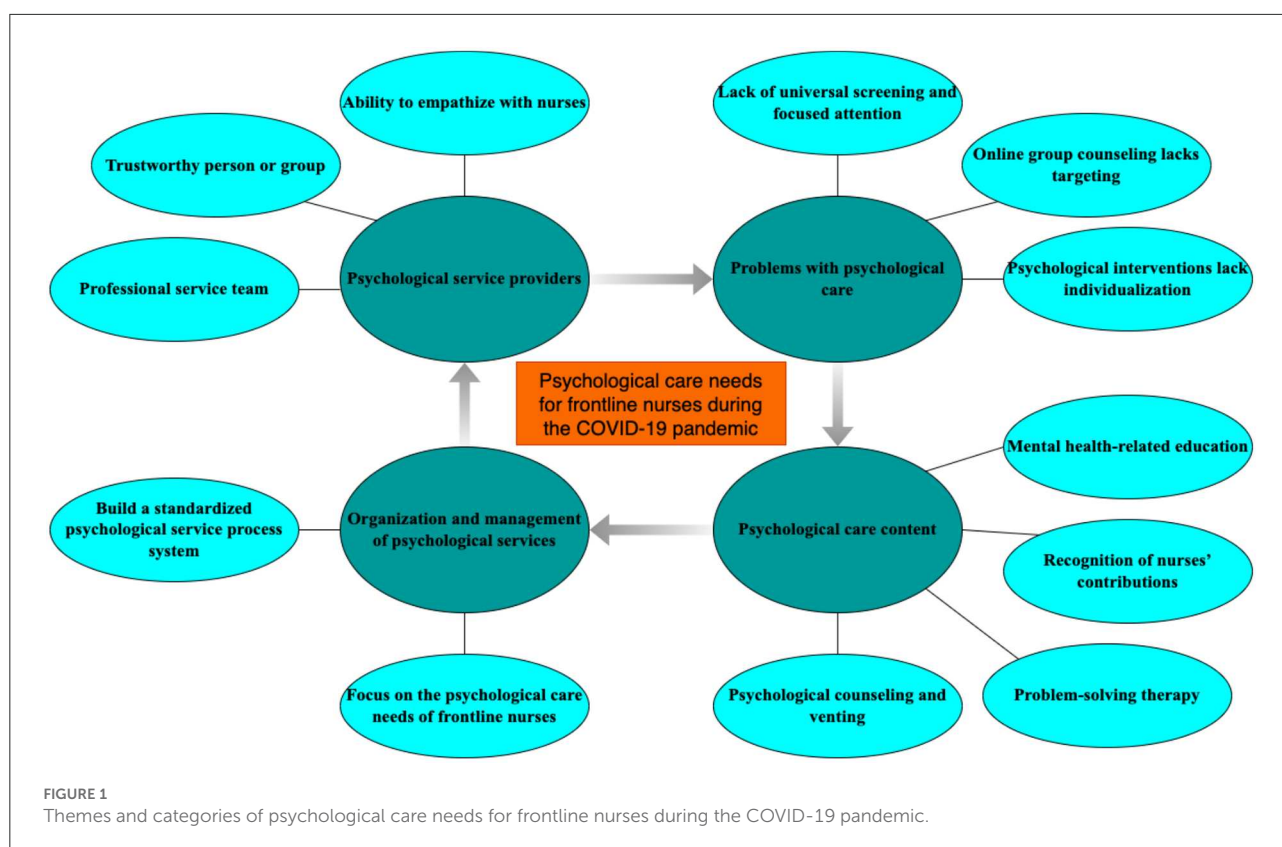
Most participants feel that the prerequisite for their willingness to actively seek psychological help is trust. If the psychological services are provided by a stranger, they may not freely express their inner feelings or even seek psychological help. They highly regard confidentiality and are, therefore, less trusting, especially to strangers. If they are not sure of confidentiality from the service provider, they would rather not seek, or seek the service from a third-party organization without interest.

"Two people can freely talk with each other because they have a certain foundation, that is, there is a foundation of trust..... For example, if you are a professional psychologist, but I'm not familiar with you, I might not be open to discussing exactly why I am seeking your help" (Interviewee 10, Age:30, Female)

"However, to a third-party service provider, I can confide in them, I can talk about all kinds of bad things and troubles encountered in all kinds of work. I can be open to them, and I don't have to worry about them telling my leader, because they only provide psychological counseling to me. They are of a charitable nature without any conflict of interest with the hospital, therefore, I don't need to worry" (Interviewee 12, Age:27, Male)

Ability to empathize with nurses

Most participants are inclined to speaking to people who can understand them, especially familiar colleagues who have the same experiences. This kind of communication lets them know that they are not alone, and that the problems they face are widespread. They especially think that colleagues with rich mental and psychological experiences can keenly capture their



ideas, understand them, empathize with them and instill hope in them.

"If they (psychological service providers) don't understand the medical industry, it won't work" (Interviewee 7, Age:41, Female)

"I am of the opinion that communication between colleagues is very important, since they have many things in common, they can easily understand each other" (Interviewee 15, Age:39, Female)

Problems with psychological care

Lack of universal screening and focused attention

Due to the COVID-19 pandemic, the high number of patients and shortage of medical staff, the current psychological care is limited to nurses who take the initiative to report and seek professional consulting. All nurses are not screened. Some participants felt that due to various reasons, some of them would be unwilling to actively seek help. Active reporting may not guarantee that all nurses in need will get help. At the same time, they felt that it was understandable that there was no universal screening. After all, there were a lot of infected people at the

time, and the medical staff were in short supply. Many medical staff were also infected with COVID-19, or were isolated as close contacts, and there were no extra mental health nurses with a speciality in providing psychological services.

"If there is a need, you can individually contact them... However, a person who is depressed, or with psychological problems may be unwilling to inform others about their condition" (Interviewee 4, Age:29, Female)

"Due to the pandemic, everyone is very busy and there is a strain on human resources, therefore, there is no general screening" (Interviewee 5, Age:37, Female)

The nurses were of the opinion that if it is impossible to achieve universal screening, we should focus on departments and populations with higher exposure risks, so as to be able to detect problematic nurses early and intervene while others felt that even if it was necessary or not, all nurses should be screened and given psychological counseling to prevent possible psychological problems.

"We don't have to wait until the problem arises for treatment. We may try and do an earlier diagnosis to find out if the problem exists, and thereby, intervene" (Interviewee 14, Age:38, Female)

"The most predisposed nurses, for example, are the ones in the fever clinic, which also has an isolation ward. This kind of place should be equipped with a special psychological team... After each shift, the nurses should be provided with psychological care services, whether necessary or not" (Interviewee 12, Age:27, Male)

Online group counseling lacks targeting

Due to the highly contagious nature of COVID-19, we found that the current psychological assistance for frontline nurses is through online consultation. WeChat group counseling is currently the most commonly used form of psychological counseling. Some nurses believe that the use of WeChat groups for group counseling has limited outcomes, because group counseling does not address the needs of each individual nurse. At the same time, since everyone's working hours are different, it is difficult to communicate in depth, and it is impossible to get timely and true feedback from everyone. Sometimes, WeChat group counseling makes people feel useless and annoying. First-line nurses need targeted psychological counseling and help, non-mechanical one-to-one communication with psychological support through text messages enhances recovery.

"In WeChat group counseling, there is no way in which targeted counseling can be conducted...I think the most important thing at this time is psychological relaxation and decompression, however, by looking at what is posted in the WeChat group, not only is there no decompression, it is also useless and annoying" (Interviewee 12, Age:27, Male)

Psychological interventions lack individualization

Most nurses believe that graded interventions should be performed depending on the evaluation results of clinical nurses' mental status, and that the frequency and duration of interventions should also be determined according to the mental status of nurses and the effect of each intervention.

"When stress occur, I feel very anxious. I feel that at the initial stress stage, interventions are frequently needed, and that they will be conducted depending on the degree of psychological stress. For example, psychological stress is how many points a nurse has scored, and if the evaluation is serious, he/she can see a psychologist every day. Sometimes, people have a stronger psychological tolerance, and then they can slightly reduce their frequency of seeing a psychologist" (Interviewee 1, Age:27, Female)

Psychological care content

Mental health-related education

The vast majority of participants mentioned that they needed mental health-related education, with some practical skills for relieving stress and relaxation. Some nurses actively sought mental health-related knowledge, or studied the knowledge provided by the hospital. In addition to improving their own mental health, nurses were also eager to gain mental health-related knowledge in order to help others.

"I think when I was struggling with anxiety, I really needed someone to support me, someone to tell me how to deal with it. When you are anxious, when you cannot sleep at night... how should you resolve this aspect, where should your focus be? There is a need to learn some methods of deep breathing, or some kind of righteous thoughts, or other various methods that can enable you relax and focus on your anxiety" (Interviewee 14, Age:38, Female)

"I had saw the psychological health propaganda video sent by the Health Commission of Hubei Province, and it did a good job. I think everyone should be suggested to have a look at it" (Interviewee 10, Age:30, Female)

Some participants believed that the cause of psychological problems may be due to a lack of mental health-related education. Nurses with the mental health-related education are not prone to stigma. Therefore, some participants suggested that general mental health-related education should be administered to alleviate nurses' stigma and prejudice. In addition to mental health-related education, they also believe that the relevant psychological knowledge can also guide them psychologically.

"I think that Chinese people's mental health-related education is not enough. When people seek psychological help, they will think that I am mentally ill" (Interviewee 11, Age:37, Male)

"If you know the knowledge about disease prevention and control, it will help you maintain a good mental state" (Interviewee 5, Age:37, Female)

Recognition of nurses' contributions

Most participants need others to appreciate their contributions, thereby, validating their efforts, especially if the appreciation is from leaders and people with great influence. Patients, patient's families, and social recognition can also improve nurses' psychological conditions.

"Leaders only need to say one sentence, sometimes one sentence is very helpful to everyone, right? Just one sentence of leadership: 'you have worked hard, you are really tired,

go back and rest early". You will feel better" (Interviewee 2, Age:32, Male)

"It means that every time you care for a patient with a novel coronavirus, your own dedication will be recognized by leadership and understood by patients, families and colleagues" (Interviewee 8, Age:24, Female)

Problem-solving therapy

Some participants were of the opinion that problem-solving was easier for relieving their psychological pressures. When a problem is resolved or eased, they feel relieved. They even think that simple psychological counseling is not very effective without solving actual problems, because, if the root cause of psychological distress is not solved, then, psychological problems will easily recur. Moreover, participants understood that some problems could not be solved at the exact time they occur, but they thought that even if the problem was unsolvable, there was a need to have a clear communication to let them know that everyone was working hard to solve it.

"For example, we experienced a lot of difficulties at that time. When we were in the west campus of the hospital, there was no shuttle bus. Then they communicated with the leaders of the west campus and changed the time of the shuttle bus. Our colleagues could go home and have a good sleep after the night shift at night..... Then it made me feel very, very relieved" (Interviewee 1, Age:27, Female)

"Let me give you an example, the negotiator that talk to those who want to jump off buildings, and are able to channel them psychologically, and then save them. But, in the long-run, it may still be necessary for some people around them to pull them out of that predicament. I think that if the problem in their own personal work is not solved, the psychological problem will recur" (Interviewee 4, Age:29, Female)

Psychological counseling and venting

Some participants were of the opinion that psychological consultation and catharsis can alleviate negative emotions. The purpose of this kind of communication is not necessarily to solve problems. Verbal comfort can alleviate many negative emotions. Some nurses simply want to vent. They also feel that by collecting their thoughts and opinions, the hospital is paying attention to them, thereby, giving them an official outlet.

"Sometimes I communicate with colleagues and leaders who are senior people in psychology, and then sometimes I talk to them in the way of chatting, so as to relieve an anxiety or a heart negative emotions" (Interviewee 10, Age:30, Female)

"At that time, during the COVID-19 pandemic, there was no way to convey many of our voices and no channel to vent them. Later, some people confided in the WeChat work group.

Including I may also confide in venting a little, after venting and then went home is fine. Maybe some people just need a channel of venting" (Interviewee 7, Age:41, Female)

Organization and management of psychological services

Focus on the psychological care needs of frontline nurses

Participants believed that psychological care was very important during the pandemic. However, they felt that the hospital did not pay enough attention to the provision of psychological services, especially psychological care for frontline nurses. With the emergence of psychological problems, a series of countermeasures were developed. They hope that the hospital will pay more attention to the psychological needs of frontline nurses.

"I think psychological counseling teams should be organized during the epidemic to carry out psychological counseling activities in the Fang Cabin, but I have not come across them and I don't know how to get in touch with them. In fact, from the Wenchuan earthquake in 2008 to now, this kind of psychological counseling groups to help frontline disaster aid workers is very small" (Interviewee 11, Age:37, Male)

"In the latter stages, several aspects, such as psychological counseling calls, slowly started to be established. Since many people were psychologically affected, these countermeasures were slowly started" (Interviewee 14, Age:38, Female)

Build a standardized psychological service process system

Due to a lack of the relevant hospital experience and emergency plans associated with psychological care, the hospital's management of nurses' psychological care in the course of the COVID-19 pandemic is rather chaotic. Some nurses hope for a standardized process system that allows them to clarify their roles and know who to seek help from, and how to seek help. They also hope that the processing system for psychological services is sufficiently complete and operable to cover not only the outbreak of the pandemic and the prevention before the outbreak, but also the recovery after the outbreak.

"Before going to the front line, we need to be provided with some psychological counseling to help us better adapt to the front line work. We also need to be provided with psychological support during the course of our work, or when at home for isolation. I think there needs to be a standardized process system" (Interviewee 5, Age:37, Female)

"It did not have any emergency plans in advance, and it did not consider this situation...there is a more practical psychological service process in case of emergencies, it would be better. Just like the suicide of a patient, if a patient has a suicidal tendency, we immediately start the suicide process of the patient, and we will clearly know what to do and how to do it" (Interviewee 7, Age:41, Female)

Discussion

To our knowledge, this is the first study that explores the psychological care needs of frontline nurses during the COVID-19 pandemic in China. These findings provide a holistic view of psychological services for frontline nurses during the COVID-19 pandemic.

The first step in emergency support is to find out who is the right person for rescue operations (24). Our study found that some nurses wanted more professional people to provide psychological services to them, and this finding is consistent with the results of a questionnaire survey conducted by Kang et al. (10) among healthcare workers in Wuhan. The reason may be that people with stronger professional skills can provide more effective psychological services and more trusted by the public. Some participants felt that counseling provided by mental health nurses had limited usefulness. This could be attributed to the fact that there is a certain gap between mental health nurses and professional psychological service providers in terms of professional ability (30). Similarly, in the guidelines for emergency psychological crisis intervention in pneumonia pandemic with novel coronavirus infection issued by the Chinese centers for disease control and prevention (CDC), it is emphasized that professional psychologists should be organized to intervene with healthcare workers who show psychological symptoms (31). Mental health nurses are composed of nurses with counselor certificates from various departments of the hospital. They set up psychological care team under the leadership of the hospital nursing department to provide psychological counseling services to clinical nurses with psychological problems in general, but they could not meet the demand for frontline nurses' psychological services needs during the COVID-19 pandemic.

In addition to professional skills, first-line nurses believe that people they trust and those who can empathize with them can provide psychological support. This finding is consistent with that of Setareh Forouzan et al. and Powell and Clarke on ordinary people receiving mental health services (32, 33). The reason could be that it is easier to open up to people you trust and who can understand you, and have deeper communication as well as exchanges that are conducive for the venting of bad emotions and the search for suitable relief methods. Therefore, in addition to considering mental health nurses' professional skills when forming a psychological service team in a hospital,

the empathy of nurses and whether they are able to be trusted should also be considered.

Assessment screening is the central theme of psychological nursing practice and the basis for interventions (34). However, due to the COVID-19 pandemic, clinical workload is heavy, and psychological service providers are strained. It may not be practical to conduct a comprehensive psychological screening of frontline nurses, so a self-reported approach to psychological services was used during the COVID-19. However, self-report measures limit the reach of psychological services, since some nurses may have a stigma and not actively seek psychological help (10). This may lead to a more serious mental illness that exerts a serious burden on the health system. Therefore, we recommend the development of a brief and rapid psychological screening tool for nurses to achieve the purpose of general psychological screening in emergency situations. In addition, we suggest that screening should be done in key departments and populations with relatively high exposure levels, and depending on the screening results, first-line nurses should be given priority interventions.

Online psychological counseling can help relieve acute stress. In a survey conducted by Cai et al. (35), more than three-fifths of nurses believed that online psychological counseling had an inhibitory effect on anxiety, insomnia, and PTSD symptoms. Zeng et al. (36) proposed that some medical staff can benefit from online consultations and that supportive WeChat groups with psychologists should be established for sharing and communication. Due to the highly contagious nature of COVID-19, and the special work of medical staff, online consultation is considered a better way for the provision of mental health services. However, this study revealed that online communication methods such as WeChat group counseling has a limited effect. All participants did not receive one-on-one counseling via video, they were of the opinion that the WeChat group counseling method cannot target an individual, and that everyone's arbitrary speech in the group may lead to negative emotions. They prefer targeted individual consultations, consistent with the findings of Setareh Forouzan et al. (32) and Kang et al. (10). This is because there are some situations where nurses are unwilling to express themselves in the group, and therefore, personal online consultation via video can be a better option.

Nurses need mental health knowledge to care for and help others (22). By being given adequate information and sufficiently trained, the competency of nurses can be improved (1). We found that knowledge education required by nurses includes psychological and professional knowledge. Most of the frontline nurses had not received any mental health training (37). In terms of psychological knowledge, most nurses just wanted to use it to help others and themselves. This is consistent with the results of a previous survey (10). This could be due to a sense of responsibility and the mission of the nursing profession. In addition to helping themselves, they also look forward to

serving patients and those around them. Furthermore, they believe that providing the relevant professional knowledge information is also helpful for their psychological protection. A recent meta-analysis confirmed this finding (38). This is possibly because the relevant professional knowledge information will reduce their sense of uncertainty and increase their confidence in fighting the disease. In the guidelines for emergency psychological crisis intervention in pneumonia pandemic with novel coronavirus infection issued by the Chinese CDC, it is also highlighted that psychological crisis intervention training is conducted before health care workers participate in the rescue, to understand the stress response and learn methods to cope with stress and regulate emotions (31). Therefore, we suggest that hospitals should routinely conduct regular psychological-related knowledge training to educate clinical nurses about psychological knowledge, especially after major public health emergencies, and provide emergency training for nurses in psychological crisis to better maintain nurses' mental health.

Problem-solving therapy is a brief evidence- and strength-based psychotherapy that has received increasing support for its effectiveness in managing depression and anxiety among primary care (39). We found that nurses have a strong preference for problem-solving therapy. They expect hospital administrators to address the difficulties they face in their work (such as supplies, shuttles, accommodations, etc.), which will make them more focused on their work itself, resulting in less stress and anxiety.

Psychological counseling and venting are convenient and effective methods. Mo et al. (40) recommended that nurses should encourage each other, discuss and share their feelings as well as experiences with someone on time, and vent negative emotions. Chan and Huak (41) indicated that being able to give management feedback can also help vent negative emotions. Our study also found that nurses wanted to have a channel to communicate their opinions to hospital administrators. We suggest that hospitals should establish channels to collect nurses' demands, pay more attention to the psychological needs of front-line nurses, and encourage them to speak their minds and vent their bad emotions.

In most countries, mental health services receive less attention than physical health (42). Previously, few interventions were put in place to meet the mental health needs of medical staff in areas affected by Ebola virus infection (43), and we also obtained similar finding. The reason may be that serious consequences such as death and disability caused by physical diseases are more obvious, while the psychological diseases are more hidden. Hospitals should pay more attention to the mental health of frontline nurses, understand the adverse effects of nurses' mental state on the healthcare system, and take active measures to adjust the mental state of frontline nurses to better control emergencies. Management of public health emergencies should adopt a systematic approach (44). However, there is currently no standardized operating procedure for Chinese

hospitals to respond to emergency psychological service systems for public health emergencies. Once a public health emergency occurs, nurses do not know what to do first and whom to ask for help from when they have psychological problems. Therefore, we recommend that hospitals should establish complete and standardized emergency psychological service systems for public health emergencies. This system includes not only the response to public health emergencies, but also prevention of emergencies, preparations for when they come, and recovery after they have happened, so as to provide frontline nurses with comprehensive and individualized psychological services that can better respond to public health emergencies.

Limitations

Inevitably, this study had limitations, three of which are noteworthy. First, we focused on the psychological care needs of frontline nurses during the COVID-19 pandemic. More studies should be done to elucidate on the psychological care needs before and after the COVID-19 epidemic. Second, this study only included the views of nurses who received psychological care services during the pandemic. Nurses who did not receive psychological care services during the pandemic also had their own unique psychological needs. Future studies should involve this population. Finally, this study was based on nurses of one hospital in Wuhan. However, China's regional and social environments are relatively complex, and the hospitals of various sizes and levels have important differences. Therefore, the applicability of the study's conclusions needs further verification. All in all, a larger range of qualitative and quantitative studies will need to be conducted in the future to extend the credibility of our existing analyses.

Conclusion

The current study provides a comprehensive understanding of the psychological care needs for clinical frontline nurses during the COVID-19 pandemic. Across these conceptual themes, we learned that frontline nurses need professional psychological service providers to provide them with psychological counseling services, and need psychological support from trustworthy people and someone who can empathize with them. They want targeted and individualized psychological interventions in the form of universal screening, based on the individual psychological state of the nurse. At the same time, they desire mental health-related education to help themselves and others, they need to be recognized by others, and they want the hospital to be able to address some of the practical issues that are troubling them psychologically, and to be able to talk about their psychological problems rather than be criticized when they arise. Likewise, they want their

psychological problems to be taken seriously by hospital leaders and a clear and standardized psychological service system to let them know what to do in case of psychological problems. By doing this, frontline nurses would be better equipped to face ongoing psychological crisis as COVID-19 continues.

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 Institutional Review Board of Union Hospital, Tongji Medical College, Huazhong University of Science and Technology (IRB number: 2021S003). 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

CD and LW: conceptualization, data collection, and transcribing. ZG: methodology. CD: software, formal analysis, writing—review, and editing. LW, ZG, and YC: validation. YC: resources and data curation. LW: writing—original draft preparation. JJ: supervision and project administration. All authors have read and agreed to the published version of the manuscript. All authors contributed to the article and approved the submitted version.

References

1. Cabarkapa S, Nadjidai SE, Murgier J, Ng CH. The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and ways to address it: a rapid systematic review. *Brain Behav Immunity Health*. (2020) 8:100144. doi: 10.1016/j.bbih.2020.100144
2. Hong S, Ai M, Xu X, Wang W, Chen J, Zhang Q, et al. Immediate psychological impact on nurses working at 42 government-designated hospitals during COVID-19 outbreak in China: a cross-sectional study. *Nurs Outlook*. (2021) 69:6–12. doi: 10.1016/j.outlook.2020.07.007
3. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. (2020) 3:e203976. doi: 10.1001/jamanetworkopen.2020.3976
4. Buselli R, Baldanzi S, Corsi M, Chiumiento M, Del Lupo E, Carmassi C, et al. Psychological care of health workers during the COVID-19 outbreak in Italy: preliminary report of an occupational health department (AOUP) responsible for monitoring hospital staff condition. *Sustainability*. (2020) 12:5039. doi: 10.3390/su12125039
5. Goldmann E, Galea S. Mental health consequences of disasters. *Annu Rev Public Health*. (2014) 35:169–83. doi: 10.1146/annurev-publhealth-032013-182435
6. Li Z, Ge J, Yang M, Feng J, Qiao M, Jiang R, et al. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain Behav Immunity*. (2020) 88:916–19. doi: 10.1016/j.bbih.2020.03.007
7. Labrague LJ, De Los Santos JAA. COVID-19 anxiety among front-line nurses: predictive role of organisational support, personal resilience and social support. *J Nurs Manag*. (2020) 28:1653–61. doi: 10.1111/jonm.13121
8. Song X, Fu W, Liu X, Luo Z, Wang R, Zhou N, et al. Mental health status of medical staff in emergency departments during the Coronavirus disease 2019 epidemic in China. *Brain Behav Immunity*. (2020) 88:60–65. doi: 10.1016/j.bbih.2020.06.002
9. An Y, Yang Y, Wang A, Li Y, Zhang Q, Cheung T, et al. Prevalence of depression and its impact on quality of life among frontline nurses in emergency departments during the COVID-19 outbreak. *J Affect Disord*. (2020) 276:312–15. doi: 10.1016/j.jad.2020.06.047

Funding

This work was supported by Health Commission of Hubei Province Scientific Research Project (WJ2021M241).

Acknowledgments

We would like to express our sincere acknowledgment to all participants who volunteered to participate in this study.

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/fpubh.2022.1043515/full#supplementary-material>

10. Kang L, Ma S, Chen M, Yang J, Wang Y, Li R, et al. Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: a cross-sectional study. *Brain Behav Immunity*. (2020) 87:11–17. doi: 10.1016/j.bbi.2020.03.028
11. Murat M, Köse S, Savaşer S. Determination of stress, depression and burnout levels of front-line nurses during the COVID-19 pandemic. *Int J Mental Health Nurs*. (2021) 30:533–43. doi: 10.1111/inm.12818
12. Nyashanu M, Pfende F, Ekpenyong M. Exploring the challenges faced by frontline workers in health and social care amid the COVID-19 pandemic: experiences of frontline workers in the English Midlands region, UK. *J Interprof Care*. (2020) 34:655–61. doi: 10.1080/13561820.2020.1792425
13. Gu B, Tan Q, Zhao S. The association between occupational stress and psychosomatic wellbeing among Chinese nurses: a cross-sectional survey. *Medicine*. (2019) 98:e15836. doi: 10.1097/MD.00000000000015836
14. Johnson J, Hall LH, Berzins K, Baker J, Melling K, Thompson C. Mental healthcare staff well-being and burnout: a narrative review of trends, causes, implications, and recommendations for future interventions. *Int J Mental Health Nurs*. (2018) 27:20–32. doi: 10.1111/inm.12416
15. Privitera MR, Rosenstein AH, Plessow F, LoCastro TM. Physician burnout and occupational stress: an inconvenient truth with unintended consequences. *JHA*. (2014) 4:27. doi: 10.5430/jha.v4n1p27
16. de Boer J, Lok A, Van't Verlaat E, Duivenvoorden HJ, Bakker AB, Smit BJ. Work-related critical incidents in hospital-based health care providers and the risk of post-traumatic stress symptoms, anxiety, and depression: a meta-analysis. *Soc Sci Med*. (2011) 73:316–26. doi: 10.1016/j.socscimed.2011.05.009
17. Bodenheimer T, Sinsky C. From triple to quadruple aim: care of the patient requires care of the provider. *Ann Fam Med*. (2014) 12:573–6. doi: 10.1370/afm.1713
18. Del Canale S, Louis DZ, Maio V, Wang X, Rossi G, Hojat M, et al. The relationship between physician empathy and disease complications: an empirical study of primary care physicians and their diabetic patients in Parma, Italy. *Acad Med*. (2012) 87:1243–9. doi: 10.1097/ACM.0b013e3182628fbf
19. Smith GD, Ng F, Ho Cheung Li W. COVID-19: emerging compassion, courage and resilience in the face of misinformation and adversity. *J Clin Nurs*. (2020) 29:1425–8. doi: 10.1111/jocn.15231
20. de Girolamo G, Cerveri G, Clerici M, Monzani E, Spinogatti F, Starace F, et al. Mental health in the coronavirus disease 2019 emergency-the Italian response. *JAMA Psychiatry*. (2020) 77:974. doi: 10.1001/jamapsychiatry.2020.1276
21. Ruzek JI, Young BH, Cordova MJ, Flynn BW. Integration of disaster mental health services with emergency medicine. *Prehosp Disaster Med*. (2004) 19:46–53. doi: 10.1017/S1049023X00001473
22. Wenji Z, Turale S, Stone TE, Petrini MA. Chinese nurses' relief experiences following two earthquakes: implications for disaster education and policy development. *Nurse Educ Pract*. (2015) 15:75–81. doi: 10.1016/j.nepr.2014.06.011
23. Rajkumar RP. COVID-19 and mental health: a review of the existing literature. *Asian J Psychiatry*. (2020) 52:102066. doi: 10.1016/j.ajp.2020.102066
24. Nekooei Moghaddam M, Saeed S, Khanjani N, Arab M. Nurses' requirements for relief and casualty support in disasters: a qualitative study. *Nurs Midwifery Stud*. (2014) 3:e9939. doi: 10.17795/nmsjournal9939
25. Sandelowski M. Whatever happened to qualitative description? *Res Nurs Health*. (2000) 23:334–40. doi: 10.1002/1098-240X(200008)23:4<334::AID-NUR98>3.0.CO;2-G
26. Willing C. *Introducing Qualitative Research in Psychology*. 3rd ed. Berkshire: Open University Press (2013).
27. Burr V. *Social Constructionism*. 3rd ed. London: Routledge (2015).
28. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today*. (2004) 24:105–12. doi: 10.1016/j.nedt.2003.10.001
29. Patton MQ. *Qualitative Research and Evaluation Methods*. 3rd ed. Thousand Oaks, CA: Sage Publications (2002). Available online at: <https://go.exlibris.link/mCtYpVgW>
30. Rydon SE. The attitudes, knowledge and skills needed in mental health nurses: the perspective of users of mental health services. *Int J Ment Health Nurs*. (2005) 14:78–87. doi: 10.1111/j.1440-0979.2005.00363.x
31. Center for Disease Control and Prevention, National Health and Wellness Commission. *Circular on the Issuance of Guidelines for Emergency Psychological Crisis Intervention in Cases of Pneumonia With New Coronavirus Infection*. Available online at: <http://www.nhc.gov.cn/jkj/s3577/202001/6adcd08b966594253b2b791be5c3b9467.shtml> (accessed October 7, 2022).
32. Setareh Forouzan A, Ghazinoor M, Dejman M, Rafeiey H, Baradaran Eftekhari M, San Sebastian M. Service users and providers expectations of mental health care in Iran: a qualitative study. *Iranian J Public Health*. (2013) 42:1106–16.
33. Powell J, Clarke A. Information in mental health: qualitative study of mental health service users. *Health Expect*. (2006) 9:359–65. doi: 10.1111/j.1369-7625.2006.00403.x
34. Coombs T, Crookes P, Curtis J. A comprehensive mental health nursing assessment: variability of content in practice. *J Psychiatr Ment Health Nurs*. (2013) 20:150–5. doi: 10.1111/j.1365-2850.2012.01901.x
35. Cai Z, Cui Q, Liu Z, Li J, Gong X, Liu J, et al. Nurses endured high risks of psychological problems under the epidemic of COVID-19 in a longitudinal study in Wuhan China. *J Psychiatr Res*. (2020) 131:132–7. doi: 10.1016/j.jpsychires.2020.09.007
36. Zeng T, Chen D, Li C, Sun Y, Liu NA. Investigation on mental health status of front-line medical staff in new coronary pneumonia medical observation sites. *Henan J Prev Med*. (2020) 31:325–7. doi: 10.13515/j.cnki.hnjpm.1006-8414.2020.05.003
37. Xiang YT, Yang Y, Li W, Zhang L, Ng CH. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry*. (2020) 7:228–9. doi: 10.1016/S2215-0366(20)30046-8
38. Luo M, Guo L, Yu M, Jiang W, Wang H. The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public - a systematic review and meta-analysis. *Psychiatry Res*. (2020) 291:113190. doi: 10.1016/j.psychres.2020.113190
39. Zhang A, Park S, Sullivan JE, Jing S. The effectiveness of problem-solving therapy for primary care patients' depressive and/or anxiety disorders: a systematic review and meta-analysis. *J Am Board Fam Med*. (2018) 31:139–50. doi: 10.3122/jabfm.2018.01.170270
40. Mo Y, Deng L, Zhang L, Lang Q, Liao C, Wang N, et al. Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic. *J Nurs Manag*. (2020) 28:1002–9. doi: 10.1111/jonm.13014
41. Chan AO, Huak CY. Psychological impact of the 2003 severe acute respiratory syndrome outbreak on health care workers in a medium size regional general hospital in Singapore. *Occup Med*. (2004) 54:190–96. doi: 10.1093/occmed/kqh027
42. Ricou M, Marina S, Vieira PM, Duarte I, Sampaio I, Regalado J, et al. Psychological intervention at a primary health care center: predictors of success. *BMC Fam Pract*. (2019) 20:116. doi: 10.1186/s12875-019-1005-9
43. Hsieh KY, Kao WT, Li DJ, Lu WC, Tsai KY, Chen WJ, et al. Mental health in biological disasters: from SARS to COVID-19. *Int J Soc Psychiatry*. (2021) 67:576–86. doi: 10.1177/0020764020944200
44. Perrin PC, McCabe OL, Everly GS, Links JM. Preparing for an influenza pandemic: mental health considerations. *Prehosp Disaster Med*. (2009) 24:223–30. doi: 10.1017/S1049023X00006853



OPEN ACCESS

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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Psychiatry

RECEIVED 19 August 2022

ACCEPTED 25 November 2022

PUBLISHED 21 December 2022

CITATION

Banse E, Petit G, Cool G, Durbecq J,
Hennequin I, Khazaal Y and
de Timary P (2022) Case study:
Developing a strategy combining
human and empirical interventions
to support the resilience of healthcare
workers exposed to a pandemic in an
academic hospital.
Front. Psychiatry 13:1023362.
doi: 10.3389/fpsy.2022.1023362

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Case study: Developing a strategy combining human and empirical interventions to support the resilience of healthcare workers exposed to a pandemic in an academic hospital

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The COVID-19 pandemic has put healthcare workers under important psychological pressure. Concerns have been raised regarding the mental health and psychological status of healthcare workers and have underlined the need for institutions to develop long-term interventions to support their resilience. The current case study presents the way a large university hospital in Brussels, Belgium, has evolved to deal with this health crisis and support its workers. Initiatives were multiple and complementary, as it was decided to combine different forms of clinical interventions that were developed by psychologists, psychiatrists, and human resources, to an empirical approach including a large survey that permitted to reach a much larger audience (the results of the study have been published previously). We describe the initially proposed measures of psychological support, including the creation of a telephone hotline, the presence of psychologists among teams of dedicated COVID-19 units, discussion groups, and individualized follow-ups, and their consequences on healthcare workers. Second, we address how these initial measures of support were modified to tailor in the best way possible the needs of healthcare workers, using a research action project that used a survey to measure and address the psychological distress of healthcare workers. We explain how, through different objectives (screening of distress, adaptation of initial measures based on reported needs, active reinforcement of individual and collective resilience, reminder of availability of help, and normalization of

distress), a research action project can be a form of support and is an effective way for an institution to show its pre-occupation for the mental health of its teams. The current case study highlights how an institution can provide support and the importance of the use of a combined strategy to limit the consequences of a major health crisis on the mental health of its healthcare workers. Improving the resilience of healthcare workers both in the short and long term is of the essence to maintain optimal care of patients.

KEYWORDS

COVID-19, mental health, healthcare workers (HCWs), resilience, psychological support

1 Introduction

In early 2020, the emergence of SARS-CoV-2 in a few months led to a worldwide major public health issue. Hospitals have had to reorganize themselves rapidly to cope with the growing number of patients infected by COVID-19. According to a report from the World Health Organization (1), the pandemic has impacted the mental health of people around the world, with certain exposed groups even more at risk. For example, studies have found that, during the pandemic, the risk for suicidal thoughts and behavior was increased for infected patients as well as healthcare workers (HCWs) suffering from exhaustion (1). Both groups have suffered from mental health repercussions induced by the pandemic.

More specifically, faced with work overload, uncertainty, risk of infection, and lack of rest, HCWs have been put under huge psychological pressure early on (2). A large proportion of them described the feeling of a “wave” washing over them and were often not prepared to face this health crisis in the long run (3). Concerns have been raised regarding the mental health of medical workers who treat and care for infected patients, and for other HCWs who had to adapt to these unprecedented working conditions (4), increasing the risk for psychological distress and burnout (5). Since the start of the pandemic, several studies have assessed the mental health of HCWs. The results of those studies indicate increased psychological distress and mental health symptoms, most often post-traumatic stress, anxiety, and depression, with growing prevalence estimates [for a review, see Hill et al. (6)].

Healthcare workers are at elevated risk of professional burnout (7), and the fragility of their mental health has been reported before the pandemic. The importance to address the psychological needs of HCWs extends beyond the COVID-19 pandemic, as the psychological well-being of HCWs has implications for the treatment and care of patients. Furthermore, there is a high risk that pandemics, such as the COVID-19 pandemic, will be repeated in the future (8), and the healthcare system and its workers need to be prepared to face

them. At the same time, the healthcare sector is globally in crisis (9–11), and HCWs manifest their difficulties more and more, as hospitals are exposed to the shortage of personnel, growing prevalence of burnout, and increasing financial demands. It is worthwhile to take a look at the origins of the distress of HCWs that has been exacerbated by the COVID-19 pandemic, and, at the institutional level, to provide HCWs with means to support their resilience in the long run.

Because new epidemics are foreseen in future decades (8), it seemed worthwhile to us to take the time to describe and reflect on the ways a hospital may adapt to such an important and urgent crisis to limit the mental consequences to HCWs.

In this article, we present in the form of a case study, the way a large university hospital in Brussels, Belgium (Cliniques Universitaires Saint-Luc) has attempted to respond to the first waves of the COVID-19 pandemic in early 2020 with the aim to support the resilience of its HCWs. The originality of the approach was to combine (1) several forms of clinical interventions developed by psychologists from the psychology department and coaches from human resources, both individually and in small groups, and (2) a survey approach that allowed to obtain information concerning a much larger audience. The results of the survey and study have been previously published (12). In this case study, we describe how individual and small-group clinical interventions can only address the issues of a very limited number of HCWs within the hospital. We then address how a large-scale assessment of the psychological consequences of the pandemic among HCWs, which took the form of a research action, had a positive impact and provided information to guide and adapt measures taken within the hospital toward supporting the resilience of HCWs. We propose a general perspective on the role of the institution to support HCWs' well-being when faced with a pandemic. A combined approach of large- and small-scale interventions will probably be necessary in the future to adapt appropriately to the needs of a large hospital when exposed to a large and intense crisis and to support the institution in improving the well-being of its employee in the aftermath.

While discussing resilience in this article, we propose to retain the definition of the American Psychological Association (13), as it is the closest to what was envisioned in the interventions described here: resilience is “... the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioral flexibility and adjustment to external and internal demands.”

2 Context and background

2.1 Coping with a pandemic: A general reorganization of the hospital's activities

In Belgium, the first cases of patients with COVID-19 were identified on 4 February 2020 (14). Rapidly, COVID-19 spread among the Belgian population with a total of 38,496 confirmed cases on 19 April 2020, which corresponds to the first peak of the pandemic in the country (15). Brussels, more specifically, was confronted with more and more cases as time went by, and as numbers increased worldwide.

At the beginning of March, the first patient infected with COVID-19 was hospitalized at the Cliniques Universitaires Saint-Luc. This hospital is one of the largest hospitals in French-speaking Belgium and one of the seven university hospitals in the country. It has a capacity of 1,000 beds. As an institution, this hospital employs over 6,000 people, of which, 1,103 are physicians and 1,619 are nurses (a total of 2,722 HCWs). During the sanitary crisis and at the peak of the pandemic (November 2020), a total of eight COVID-19 hospitalization units have been opened, accommodating up to 157 patients simultaneously. In the intensive care unit, the number of simultaneous patients stopped at a maximum of 36 patients. The clinics were never exceeded (16).

On March 13, the Belgian Minister of Health ordered all hospitals in the country to activate the Hospital Emergency Plan to be able to receive a massive and simultaneous influx of patients with COVID-19. For doing so, medical activities considered non-urgent were canceled within a few days (16). HCWs were mobilized to work in dedicated COVID-19 units, different from their usual ones, worked long shifts, and sometimes had to do work they were not trained for, helping each other as a solidarity movement quickly developed itself among staff members. The hospital environment soon changed in a radical way to meet the needs of infected patients suffering from respiratory failure (17). HCWs were confronted with huge needs but had to respond to them with limited resources.

Due to the reorganization, the usual activities of most psychologists were canceled. In psychiatry, the activity both in the emergency room and in the psychiatric ward was maintained. However, a part of the staff was maintained at home

and worked in a shift mode, to avoid contamination among all staff members. This means that part of the staff could be mobilized to respond to the needs of HCWs, where rapid signs of distress and exhaustion were emerging due to overwork, a sense of helplessness, the stress of the risk of infection, high mortality encountered within these units, and constant confrontation to death and to dehumanizing situations, such as the impossibility to respect usual rituals around the person that had deceased (due to risks of infection), and the necessity to conform to complex procedures to avoid contamination.

More specifically, HCWs were initially confronted with the exacerbated emotions of patients. Usually, HCWs are used to being exposed to the feelings of patients, but the pandemic gave these experiences an even more dramatic connotation, due to the fear of being infected and contaminating others, the large number of hospitalizations, intubations, and deaths. In this context, the sector of Psychology of the Cliniques Universitaires Saint-Luc, in collaboration with the service of Adult Psychiatry, the Human Resources department, and the Management of the hospital, decided to offer support to HCWs of the hospital (17).

Other groups of the general population, including patients infected with COVID-19, were also at great risk of suffering from psychological problems. Various studies in different parts of the world noted a high prevalence of symptoms such as anxiety, depression, and post-traumatic stress disorder among infected patients (18). Interventions addressing those symptoms are as important as interventions targeting the mental health of HCWs. Even if not discussed in detail here, at the Cliniques Universitaires Saint-Luc, psychological support was also offered to patients and their families, in the forms of a telephone hotline and the presence of psychologists in the various COVID-19 units.

2.2 Psychological support offered to HCWs during the first wave

The American Psychological Association (19) proposes to define psychosocial support, a term often used interchangeably with psychological support, in this way: Psychosocial support is “a broad term describing a range of services offered by mental health professionals to those in pressing need. Whether designed to help individuals cope with a serious illness or to alleviate distress in whole communities following a disaster (...), such services may range from mental health counseling, psychoeducation, and group support to spiritual support and other assistance and are provided by psychologists, social workers, and pastoral counselors, among others.”

With no prior indication of what would be efficient to answer the needs of the hospital and its employee, different types of interventions were proposed to the HCWs by the psychologists/psychiatrists and Human Resources of the

hospital. Those first intervention measures are described later and aimed at offering psychological support to the HCWs.

A telephone hotline was created to respond to the distress of the HCWs of the hospital. The objective of this hotline was to respond to the need to talk, the anxieties, uncertainties, and impotence of HCWs (17). Surprisingly, it received only very few calls, even though the requests were frequent in the hospital units. When questioned later, HCWs answered that they did not have time to call the hotline during working hours and that they would not call the hotline after their working shift, as they were willing to escape the hospital rapidly after an exhausting day, or possibly because calling an unknown person on the phone is not natural to most HCWs. A reflection was, therefore, held regarding the inadequacy between this hotline and the overwhelming distress of HCWs (17). As, in parallel, some psychologists were directly working in the units, their experiences soon led to the conclusion that the work of psychologists in the field was most important.

While half of the units were transformed into COVID-19-specific units, that exclusively cured patients infected with COVID-19, psychologists were invited, on a voluntary basis, to integrate and “share the fate” of these units (17). In this case, the presence of the psychologists brought important support both to patients and families and to the teams. Their groundwork interventions allowed teams to reflect on their actions and the reality of the field and to rehumanize their significance. Psychologists were present to hear and accompany HCWs, both individually and collegially, in informal ways first, to respond to implicit requests for support. The presence of psychologists in the units also permitted individual interviews with some HCWs, when they were presenting alarming signs of distress, and to help orient them for individual follow-ups with psychologists or psychiatrists when necessary.

There was, however, sometimes persisting distress within some of HCWs’ teams, either secondary to the pandemic or when the pandemic had put special pressure on a team where relational difficulties were already present before the pandemic and were exacerbated by the crisis. This led to the constitution of formal discussion groups in COVID-19 units, where members of the teams were gathered to exchange on the difficulties of the team, in the presence of a psychologist or a psychiatrist that was not working directly with the team, but who could understand what the team was going through and be trusted by the HCWs. The role of the psychologist or psychiatrist was either to help debrief on the traumatic situations that were met or when the issues were related to more ancient difficulties, to encourage the members of the team to share their difficulties and elaborate solutions to improve the situation, acting as an external witness (17).

The teams of psychologists and psychiatrists worked directly with nurses’ management to share the fields’ status and be able to adapt the interventions to the needs. As chief nurses of each clinical unit are key relays to understand and detect the

difficulties and distresses within their units, specific coaching of the chief nurses was organized both by the human resources department and the psychologists’ teams.

Finally, more specific and individualized follow-ups were proposed for caregivers who were more at risk and felt they needed to receive individual psychological consultations. However, these types of interventions within the hospital were limited, as part of the distressed HCWs were likely consulting outside of the hospital.

These early-on interventions led to the subjective observation of real distress among caregivers, in this first instance in the form of psychological observations. Distress took the form of symptoms such as feelings of saturation and overflow, emotional lability or difficulty in emotional management, excessive reactivity, hyperactivity or even defensive exaltation, anxiety or even acute stress, depressive involution, and major sleep disorders including nightmares, intrusive thoughts, ruminations, and flashbacks (17). The important collaboration developed between nurses’ teams and psychologists probably somehow dampened the intensity of the distress and helped pass through the crisis.

However, although the intervention had probably a positive impact on the well-being of the teams, a large proportion of the HCWs did not have the opportunity to receive some support.

3 Action research

3.1 Introduction and objectives

To address this issue on a larger proportion of HCWs, an action research project was set up at the hospital, nourished by feedback from the psychologists working in the field, from management, and caregivers themselves. They were the interveners that alerted on the need to objectify the distress and difficulties of the caregivers. A survey was, therefore, created to measure and address the psychological distress of HCWs. The study assessed the magnitude of psychological symptom expression in HCWs after the first wave of the COVID-19 pandemic and tested the existence of the vulnerability and protecting factors influencing the psychological response of HCWs to the pandemic. The finalities of this research action were multiple and listed later.

First, the objective of this research was to collect the experiences of the institution’s caregivers, to identify those in psychological distress, and offer them appropriate help (1: screening of people in pain). Based on the collected data, this project also gave the possibility to evaluate current actions taken at the institutional level and tailor them to get closer to the needs of HCWs (2: analysis and adaptation of measures based on the obtained results). In the first phase of pandemic management within the hospital, the teams of psychologists and psychiatrists who worked directly with HCWs did not

have any role in reorganizing the work and rest regimes of the HCWs. Their role was rather to support and help the HCWs to “cope” with the situation. It is the research action project and its results, in a second phase, that helped to raise awareness among the broader management and decision-makers of the hospital, who had decision-making authority. Positive effects of the research itself on resilience were expected since the research included open questions (detailed in the next section) and writing has been shown to have a therapeutic effect and can lead to “significant physical and mental health improvements” (20) (3: active reinforcement of individual and collective resilience and autonomy). Participants also received individual feedback at the end of the questionnaire, which allowed each one to situate his or her state of stress and indicated the need to seek help or not (4: availability of help, without forcing it). The fact that the survey was sent to all the hospital’s carers may have normalized the existence of psychological suffering among them, informing that symptoms could be shared. This may have reduced possible feelings of loneliness or shame (5: normalization of distress and reduction of stigma).

In summary, this research action project was designed to report on the situation and on the lived experiences of HCWs on the field. We hoped that, in an indirect way, it would help provide support for resilience. In addition, this research was a way to show that the institution was showing consideration to the distress of HCWs induced by the pandemic.

General information regarding the methodology of this research is described in the next section. For the interested reader, a previously published article solely focuses on this study and provides information regarding the theoretical background, material, types of questionnaires, and references used (12). In this article, our objective is rather to describe how the results of this research action project led to changes in the actions taken to help support HCWs in the hospital.

3.2 Methodological framework

The action research project was launched in June 2020, 3 months after the peak of first-wave hospitalizations. After communicating the purpose of the study to the various healthcare teams of the hospital, an individual email was sent to the HCWs explaining the objectives of the study (including the support of resilience, screening of distress, and willingness to collect information with the goal of preparing for a future pandemic/wave). The study link was associated with the email, and possibilities for personal help were also provided. The study link was active between 23 June and 30 July 2020.

The questionnaire included sociodemographic and situational items focusing on professional and COVID-19-related contexts, as well as the investigation of psychological disturbances *induced by the COVID-19-situation* (level of post-traumatic stress, anxiety, depression, and insomnia symptoms;

measures of the intensity of experienced symptoms). Individual differences in emotion regulation, coping strategies, and personality traits were also assessed. Retrospective questions evaluated the persistence of certain symptoms.

Finally, the online study also included four open-ended questions investigating, namely stress factors, what was most missing during the crisis, what worked well, and what were the most difficult aspects post-COVID-19, to allow written expression. Those questions aimed at obtaining detailed qualitative information about the HCWs experience. Answering those types of questions also can have a therapeutic effect (20) and therefore is a mode of action in itself. The survey also included the possibility of asking to be contacted by a psychologist if needed.

This study was addressed to nurses and doctors. A total of 542 out of the 2,706 persons that were contacted by email responded to the study (20% of the HCWs of the hospital). 73% of the respondents were nurses, and 27% were physicians. Respondents were mainly women (80%), knowing that among HCWs of the hospital, 53% of the physicians are women and 86% of the nurses are women. Where the telephone line initially set up did not receive many calls, *via* the questionnaire, one-fourth of the participants (125 people) were able to be contacted again by a psychologist with possibly the establishment of a therapeutic follow-up on a longer term.

As explained earlier, more details of the survey and its construction are reported in a previously published article (12). The results of the study are also described in this published article. The next section describes how the most relevant results-oriented actions are taken at the institutional level to support HCWs in the best way possible.

3.3 Actions taken based on the results of the research action

The findings of the study highlighted various facets of the first wave’s consequences on HCWs. They also permitted us to isolate situational and personal factors that predict psychological symptoms in HCWs. As a clarification, in this article, we refer to the generic term “psychological symptoms” to define a set of manifestations of distress that HCWs could experience or manifest in the context of the COVID-19 pandemic and based on existing literature. Measures used in the study assess the intensity of experienced symptoms but not psychiatric diagnoses.

An important consequence of the observations raised by the survey on how the first wave affected HCWs, added to more qualitative observations from psychologists and other HCWs working in the clinical units, was the adaptation of interventions by the management to fit more precisely with the needs of the hospital.

First, the results of the study showed the important psychological strain endured by HCWs of various teams during the first waves of the pandemic, as illustrated by the incidence of psychological symptoms (post-traumatic stress, anxiety, depression, and insomnia). This distress was not only observed in HCWs' teams directly caring for patients infected with COVID-19, as the proportion of distress was not different among other team HCWs, where more usual activities were still ongoing. In some of these teams, the exposure to increased risks of contamination, with protection measures that were not reinforced, probably participated to the distress. The first important conclusion to draw from the survey was, therefore, to modify the initially taken measure of proposing psychological support exclusively to COVID-19 dedicated healthcare teams. Psychological support also needed to be proposed to other units of the hospital that experienced other forms of emotional distress related to the general context of the pandemic. These observations also support the importance of the work of the psychologists in the various units of the hospital.

A second important conclusion from the study was related to the persistence of symptoms at the end of the first wave. Three months after the beginning of the pandemic, a large proportion of the symptoms persisted and sometimes even increased among HCWs. This means that the institution must continue to pay attention to the psychological well-being of HCWs in the long run and that long-term interventions to support HCWs are warranted whenever possible. Focusing only on the present situation was not enough. This observation from the survey was also confirmed by the group interventions where difficulties, that sometimes had other origins than the pandemic, were still very vivid after the end of the pandemic (e.g., relational tensions between staff members, exhaustion of healthcare workers, and previous team reorganizations).

Third, the results of the study indicated that symptoms of psychological distress, even though present among physicians as well, were more pronounced among nurses (article under review). According to Pappa and collaborators (21), the nature of the work of nurses (in direct and close contact with patients) could be an explanation for this difference in symptom reports. Nurses need to be accompanied in the best way possible, and specific attention needs to be paid to their work and the psychological risks associated with it. The specific sensitivity of the nurses to distress was, indeed, addressed by the institution, as most of the interventions after the first wave targeted nurses, chief nurses, and nursing teams. However, the relatively increased expression of distress in nurses does not mean that there is no need to address distress in physicians. Physicians are usually less easily asking for psychological support than nurses. According to studies, physicians are more reluctant to ask for help or trust other caregivers when it comes to their own health, often consulting for exhaustion at more severe stages (22). Treatment compliance can also be poorer for physicians than for other HCWs, as it is difficult for them to put themselves

in the role of patients. It might, therefore, be important to design other types of interventions to increase their likelihood to adhere to psychological support and tailor strategies to respond to barriers to psychological support among physicians (22–24).

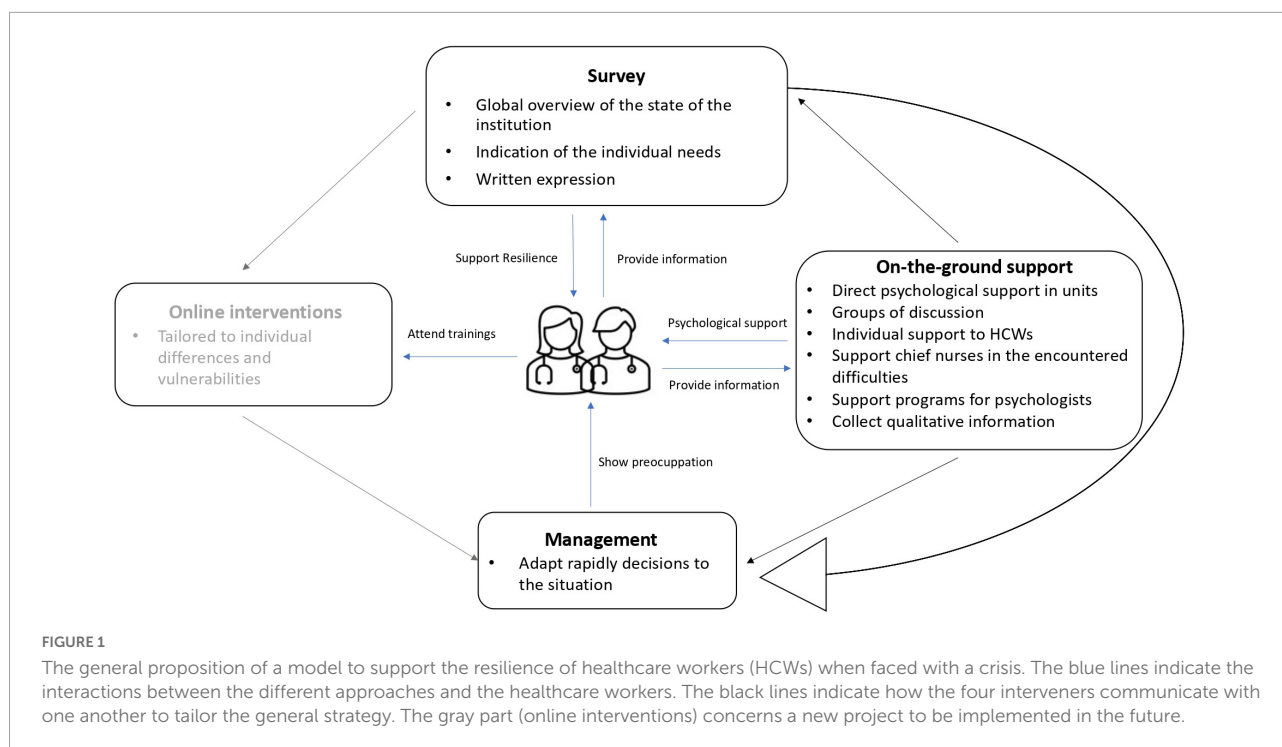
Lastly, the study allowed to study relationships between psychological symptoms and various possible risk factors. For the interested reader, these detailed associations can be found in the article of Mennicken and colleagues (12). By isolating personal and situational factors that could predict psychological issues of HCWs in relationship to the COVID-19 pandemic, we can propose that specific points of attention might be targeted by interventions.

It seemed, for example, that work overload was one of the most important predictors of the severity of psychological distress. This point was raised and discussed with the management of the hospital. However, the important distress also led to increased absenteeism and, progressively, the shortage of nurses on the job market led to even more work overload for those still present, with a risk of a negative spiral between overload, distress, and absenteeism. Nevertheless, the information on work overload given by the survey echoed, and the management considered that before adding more workload and stress on teams in link with specific projects. In addition, a new form of a computerized patient record, a project that was planned before the pandemic and that could not be postponed, was recently introduced at the hospital and was certainly experienced as excessive by the teams in addition to the pandemic context.

Emotionality, coping style, and past trauma were also related to psychological distress among HCWs. This specific result highlighted the importance of paying attention to interventions aimed at supporting the resilience of HCWs and individual differences among HCWs. Indeed, those individual differences may be important in how one reacts to the pandemic. It was, however, not possible to propose, at the time of the pandemic, specific interventions to improve these individual coping and emotion regulation dimensions. These questions could be addressed efficiently, possibly by online interventions, targeting the individual difficulties met by HCWs specifically.

Finally, the quality of social support was also shown to be an important protective factor against the expression of psychological symptoms and distress. Institutions can play a role in how well HCWs feel supported in the context of their work, by, for example, preserving in the best way possible the unity of their teams. In other words, dissociating teams, which is sometimes a necessity when a hospital must reorganize its activities rapidly, often has negative consequences on HCWs' well-being. The management hospital later attempted, whenever it was possible, to limit team splitting.

The interesting results obtained by the study and the observation of a direct influence on the decisions that were taken by the management for other waves of the pandemic led us to think of implementing a second part of the study,



as the objective was to maintain a long-term follow-up of the symptoms and risk factors. This part of the study was recently launched with the idea of extending the study to all personnel of the hospital (HCWs and non-HCWs), to reach a larger number of people. Comparing the reactions of HCWs and non-HCWs will also provide us with interesting information on the specificities of the way HCWs cope with the pandemic in terms of mental health. This second part of the study will also make it possible to receive feedback on perceived organizational support and how to better it in the future.

3.4 A combination of approaches to reach different goals and targets

In our case, the clinical interventions with individuals or groups clearly had a different purpose than that of the survey. Clinical interventions permitted to provide individual support to distressed HCWs, local support to teams enduring the pandemic situation, help disentangle team difficulties, and support to chief nurses, who assisted in identifying most of the HCWs in distress, and playing their essential role when exposed to teams in difficulty. All these interventions are of high qualitative value and participate in the general resilience of the institution. However, they only concern a limited number of teams and individuals (the numbers are depicted in [Supplementary Figures 1, 2](#)). The research action survey was responded by more than 542 HCWs who were provided the opportunity to give a written testimony of what they were

experiencing which may also be valuable in terms of emotion regulation (20). We believe that those two types of interventions are clinically relevant and complementary. Furthermore, concerning the information that was transmitted to the management and could influence their orientation, they were also different, more qualitative or quantitative, respectively.

4 Discussion

In this article, we have presented how an institution has reacted to the first waves of the COVID-19 pandemic by implementing measures of psychological support and modifying them, based on the feedback on HCWs' needs collected through an action research project. The aim of the initially offered psychological support was to pay close attention to the mental health of HCWs and promote their resilience in the context of a major health crisis. Initiatives included telephone permanence, discussion groups, psychological support in the units, and individualized follow-ups, with the important support of the Human Resources department. In parallel, an action research project allowed us to (1) evaluate the psychological symptoms of HCWs during and after the first waves of the pandemic and objectify the psychological distress of HCWs, (2) link them with associated factors including personal and situational variables, and (3) considering the results, adapt existing measures for them to target HCW's needs more precisely.

Creating a strategy that combines a clinical and empirical approach is an interesting pathway to follow as it can help to

achieve greater coverage of an entire hospital institution. Indeed, the originally proposed measures of psychological support provided qualitative help to individuals and teams through clinical and coaching interventions. However, we were unable to reach all HCWs. We suppose it is due to various reasons. For example, we know that addressing burnout of physicians, who form a large proportion of the HCWs of a hospital, is related to specific challenges, as physicians are more reluctant to trust other caregivers when it comes to their own health or place themselves in the role of patients. Many factors, such as medical education, professional culture, and the general image of this profession in society, all contribute to challenges (22). We feel as if some healthcare workers are reluctant to seek help due to fear of stigmatization, unwillingness to talk to a stranger about it, etc. Future forms of interventions and treatments to help HCWs will need to include those challenges and obstacles to treatment and change.

The anonymous survey allowed the possibility to reach a larger number of HCWs and to describe difficulties through open- and closed-ended questions. Sometimes, it permitted some HCWs to become aware of their own distress and, therefore, ask for psychological support in the second stage. As such, clinical measures are complementary to using a survey when it comes to supporting the resilience of HCWs exposed to a pandemic.

The research action presented in this article certainly suffered from limitations. The generalizability of our results may be questioned as the number of participants in the survey is limited (due to work overload and the length of the survey). The cross-sectional nature of the project did not allow for causal conclusions to be drawn. Longitudinal follow-ups will be needed to observe whether the newly implemented measures influence the psychological well-being of HCWs.

However, this article highlights the importance, when faced with a crisis such as the COVID-19 pandemic, of an institution to understand and meet the needs of HCWs early on. Using the format of an action research project is a useful way to understand the lived experiences of HCWs and adapt forms of support based on these reports. More precisely, large-scale surveys are an effective way to obtain information on how to tailor the needs of HCWs. An approach to a large number of persons based on surveys has an important value that should not be neglected. Moreover, using open-ended questions allows for written expression. In doing so, it is already a mode of action and supports resilience in itself, as it can have therapeutic effects (20).

5 Conclusion

In summary, **Figure 1** proposes a scheme as a general model that could be applied in health institutions to face a major

(health) crisis such as the COVID-19 pandemic, as well as appropriate actions for burnout prevention in HCWs.

Both institutional and individual approaches need to be combined as a means to respond to the issue of HCWs' well-being (24–26). The use of a survey approach can help link these two approaches, by giving a global overview of the institution. Crossed with the more qualitative information collected in the field (notably by psychologists working in the unit or direct relation with chief nurses for instance), a clear picture can be obtained of the psychological distresses and needs of caregivers. Effective communication between management, researchers (who analyze the results of the survey), and clinicians is essential to build up efficient responses to the needs of HCWs. A loop can, therefore, be imagined between management (who will make decisions and take actions in terms of support), the use of a research action survey (to obtain information on the status of HCWs), and on-the-ground interventions (more qualitative information). In the future, we also plan to propose online training that would be customized according to the individual differences and vulnerabilities of each person, to answer correctly to the individual needs as has been done earlier in other contexts (27).

The COVID-19 pandemic and the ensuing difficulties met by teams of HCWs in the hospitals of several countries have highlighted the necessity for institutions to adapt themselves to support the well-being of HCWs accordingly. Creative and possibly multifaceted solutions will be needed in the future to respond appropriately to this very complex challenge.

Data availability statement

Data regarding the survey may be made available upon request. Requests to access these datasets should be directed to GP, geraldine.petit@uclouvain.be.

Ethics statement

The studies involving human participants were reviewed and approved by Comité d'Ethique Hospitalo-Facultaire of the Cliniques Universitaires Saint-Luc, code 2020/15JUI/321. The patients/participants provided their written informed consent to participate in this study.

Author contributions

GC, IH, and JD had participated in the elaboration of the general strategy adopted by the hospital. GP and PT had participated in the construction and development of the survey. EB, YK, and PT had contributed to the writing of the original draft, reviewing, and editing of the manuscript. All authors gave

final approval of the version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved, and made substantial contributions to the conception or design of the work, or the acquisition, analysis, or interpretation of data for the work.

Funding

The study described in this article was funded by the Fondation Saint-Luc. It had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the article; and decision to submit the article for publication.

Acknowledgments

We would like to thank all of the HCWs who had to deal with the pandemic consequences, as well as those who have participated in all groups and/or responded to the survey.

References

- World Health Organization. *Mental Health and COVID-19: Early Evidence of the Pandemic's Impact: Scientific brief, 2 March 2022. Report No.: WHO/2019-nCoV/Sci_Brief/Mental_health/2022.1.* (2022). Available online at: https://www.who.int/publications-detail-redirect/WHO-2019-nCoV-Sci_Brief-Mental_health-2022.1 (accessed October 4, 2022).
- Sun P, Wang M, Song T, Wu Y, Luo J, Chen L, et al. The psychological impact of COVID-19 pandemic on health care workers: a systematic review and meta-analysis. *Front Psychol.* (2021) 12:626547. doi: 10.3389/fpsyg.2021.626547
- de Timary P, Cool G. Hommage aux infirmier(e)s, hommage aux travailleurs de la santé. *Louvain Méd.* (2020) 139:354.
- Søvdal L, Naslund J, Kousoulis A, Saxena S, Qoronfleh M, Grobler C, et al. Prioritizing the mental health and well-being of healthcare workers: an urgent global public health priority. *Front Public Health.* (2021) 9:679397. doi: 10.3389/fpubh.2021.679397
- Leo C, Sabina S, Tumolo M, Bodini A, Ponzini G, Sabato E, et al. Burnout among healthcare workers in the COVID 19 era: a review of the existing literature. *Front Public Health.* (2021) 9:750529. doi: 10.3389/fpubh.2021.750529
- Hill, J, Harris C, Danielle L, Boland P, Doherty A, Benedetto V, et al. The prevalence of mental health conditions in healthcare workers during and after a pandemic: systematic review and meta-analysis. *J Adv Nurs.* (2022) 78:1551–73.
- Shanafelt T, Boone S, Tan L, Dyrbye L, Sotile W, Satele D, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med.* (2012) 172:1377–85. doi: 10.1001/archinternmed.2012.3199
- Jones K, Patel N, Levy M, Storeygard A, Balk D, Gittleman J, et al. Global trends in emerging infectious diseases. *Nature.* (2008) 451:990–3.
- Cash R. Crise de l'hôpital public ou crise du système de soins? *Trib St.* (2022) 71:47–59.
- Godderis L. *Les Secteurs Des Soins Face à 36% D'absentéisme En Plus Que Les Autres Secteurs.* Brussels: IDEWE (2021).
- Deloitte. *What Will be the Impact of the COVID19 Pandemic on Healthcare Systems?.* Puteaux: Deloitte Paris (2020).
- Mennicken B, Petit G, Yombi J, Belkhir L, Deschietere G, Germeau N. Psychological distress among hospital caregivers during and after the first wave of COVID-19: individual factors involved in the severity of symptoms expression. *Psychiatr Res Commun.* (2022) 2:100037. doi: 10.1016/j.psycom.2022.100037
- American Psychological Association. *APA Dictionary of Psychology – Resilience.* Washington, DC: APA Dictionary of Psychology (2020).
- Galindo G. *First case of Coronavirus Confirmed in Belgium.* Brussels: The Brussels Times (2020).
- Sciensano. *Covid-19 Belgium Epidemiological Situation – Cases.* Brussels: Sciensano (2020).
- De Nayer T. *Saint-Luc au Temps du COVID-19.* Brussels: Service de communication des Cliniques universitaires Saint-Luc A.S.B.L (2020).
- Robkani L, Saussez J, Chauvier P, Baurain C, Chatelle N, Chanteux F, et al. Interventions psychologiques dans les unités COVID. *Louv Med.* (2020) 139:349–53.
- Dong F, Liu HL, Dai N, Yang M, Liu J. A living systematic review of the psychological problems in people suffering from COVID-19. *J Affect Disord.* (2021) 292:172–88.
- American Psychological Association. *APA Dictionary of Psychology – Psychosocial Support.* Washington, DC: APA Dictionary of Psychology (2020).
- Pennebaker J. Writing about emotional experiences as a therapeutic process. *Psychol Sci.* (1997) 8:162–6.
- Pappa S, Ntella V, Giannakas T, Giannakoulis V, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun.* (2020) 88:901–7.
- Lenoir A, Troyer C, Demoulin C, Gillain I, Bayot M. Challenges in treating physician burnout: the psychologist's perspective. *Presse Med Open.* (2021) 2:100006.
- Clough B, March S, Leane S, Ireland M. What prevents doctors from seeking help for stress and burnout? A mixed-methods investigation among metropolitan and regional-based Australian doctors. *J Clin Psychol.* (2018) 75:418–32. doi: 10.1002/jclp.22707

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsy.2022.1023362/full#supplementary-material>

24. Swensen S, Kabacene A, Shanafelt T. Physician-organization collaboration reduces physician burnout and promotes engagement: the mayo clinic experience. *J Healthc Manag.* (2016) 61:105–27.
25. Zhang X, Song Y, Jiang T, Ding N, Shi T. Interventions to reduce burnout of physicians and nurses: an overview of systematic reviews and meta-analyses. *Medicine.* (2020) 99:e20992. doi: 10.1097/MD.00000000000020992
26. Panagioti M, Panagopoulou E, Bower P. Controlled interventions to reduce burnout in physicians: a systematic review and meta-analysis. *JAMA Intern Med.* (2017) 177:195–205.
27. Brianda M, Roskam I, Gross J. Treating parental burnout: impact of two treatment modalities on burnout symptoms, emotions, hair cortisol, and parental neglect and violence. *Psychother Psychosom.* (2020) 89:330–2. doi: 10.1159/000506354



OPEN ACCESS

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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

RECEIVED 19 August 2022

ACCEPTED 12 December 2022

PUBLISHED 13 January 2023

CITATION

Cheung AT, Ho LLK, Li WHC,
Chung JOK and Smith GD (2023)
Psychological distress experienced by
nurses amid the fifth wave of the
COVID-19 pandemic in Hong Kong: A
qualitative study.
Front. Public Health 10:1023302.
doi: 10.3389/fpubh.2022.1023302

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Psychological distress experienced by nurses amid the fifth wave of the COVID-19 pandemic in Hong Kong: A qualitative study

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Introduction: The fifth wave of COVID-19 has significantly overburdened the health care system in Hong Kong. Health care professionals, particularly nurses continue to experience significant levels of psychological distress when tackling this ongoing outbreak. Yet, no study has explored the psychological experiences of nurses during the most recent outbreak of the highly transmissible Omicron variant in Hong Kong. The aim of this qualitative study was to explore the psychological distress experienced by nurses during the fifth wave of the COVID-19 pandemic in Hong Kong.

Methods: Twenty-two nurses (14 female and 8 male nurses; average age, 36.7 ± 8.5 years) were recruited to attend the one-to-one semi-structured telephone interviews from June to July, 2022. Data were analyzed using thematic analysis.

Results: Four main themes emerged from the interview: (1) Intense fear, worry, and anxiety; (2) Feeling worn out and psychologically distressed; (3) Impact on psychosocial and physical health; and (4) Limited options to cope with psychological distress during the difficult times.

Discussion: Our study findings may provide concerned stakeholders with useful insights into reducing the psychological distress experienced by nurses in Hong Kong. Offering psychological support is of paramount importance to address the unmet psychological needs of nurses and reduce their psychological distress during the pandemic, particularly when they are working under high levels of workplace stress.

KEYWORDS

COVID-19, nurses, mental health, psychological distress, pandemic

1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic has spread rapidly across the globe. It has caused a global mental health crisis and continues to stretch the health care system to its limit. As of August 15, 2022, more than 580 million confirmed

cases and 6 million deaths have been reported worldwide (1). On November 26, 2021, the World Health Organization (WHO) declared the Omicron (B.1.1.529) variant as a global concern based on the advice of the WHO's Technical Advisory Group on SARS-CoV2 Virus Evolution (2). The Omicron variant is the most transmissible among all existing SARS-CoV-2 strains and has become the dominant strain in many countries. Moreover, this highly infectious strain has caused numerous difficulties in the control and management of COVID-19.

Hong Kong's overall COVID-19 tally currently stands at 1,421,918 reported cases, with 9,569 fatalities, as of August 15, 2022 (3). The Omicron variant has caused a fifth wave of the pandemic, pushing Hong Kong's health care system to the brink of collapse. A total of 1,409,287 COVID-19 cases and 9,356 deaths have been recorded since the fifth wave December 31, 2021 (3). Hong Kong's public health care system has been overwhelmed and short-staffed before the pandemic emerged (4). With the unpredictable nature of the COVID-19 pandemic, there is a constantly changing demand for nurses, which has been epitomized by the fifth wave of COVID-19 in Hong Kong. Hong Kong seems to have an effective response to deal with the pandemic by implementing a "zero-tolerance" policy since 2020. However, owing to the highly contagious Omicron variant in Hong Kong in late 2021, there is an unprecedented surge in the number of older and critically ill patients with COVID-19 amid the fifth pandemic wave, further adding burden on the health care system (5). In addition, the entire nursing workforce is currently facing a significant challenge as the fifth COVID-19 wave in Hong Kong has exacerbated the shortage of nurses and other health care professionals. Health care professionals, particularly nurses, are at increased physical and psychological risks due to direct patient care (6–8). A study reported that nurses are experiencing unprecedented psychological distress and burnout amid the pandemic (9). These may be attributed to elevated occupational risks, including occupational infections with COVID-19, limited resources, having to work in understaffed clinical areas, disruption to work-life balance, stigma, and discrimination (10). A meta-analysis of 55 cross-sectional studies involving 189,159 participants belonging to the general population and the health care sector across countries reported that 16.0% of the participants experienced depression symptoms, 15.2% experienced anxiety symptoms, and 22.0% experienced post-traumatic stress symptoms amid the COVID-19 pandemic (11). Of note, a study found that nurses reported more severe symptoms of insomnia and psychological distress than other health care professionals (12). Moreover, frontline jobs may contribute to the risk of poor psychological wellbeing (12, 13) as health care professionals engaged in direct diagnosis, treatment, and care of patients with confirmed/suspected COVID-19 (12).

A few studies have reported health care professionals' experiences of caring for patients with COVID-19 during the early stages of the COVID-19 outbreak (14–17). The fifth

wave of COVID-19 has significantly overburdened the health care system. Health care professionals continue to experience significant levels of psychological distress during this ongoing outbreak. However, to the best of our knowledge, no study has explored the psychological experiences of nurses during the most recent outbreak of the highly transmissible Omicron variant in Hong Kong. It is crucial to bridge this gap in the literature to design and provide appropriate interventions to address the psychological needs of nurses in Hong Kong during the continuing global pandemic. Therefore, this study aimed to explore the nurses' psychological experience amid the Omicron wave in Hong Kong.

2. Materials and methods

2.1. Aim, study design and participants

This exploratory qualitative study was conducted to explore the psychological distress experienced by nurses during the fifth wave of the COVID-19 pandemic in Hong Kong. A research nurse first recruited nurses through word-of-mouth sampling (i.e., passing information regarding this study within the communication network of nurses via a professional nursing organization). This was then followed by the use of a purposeful and snowball sampling technique to recruit registered nurses in different acute hospitals in Hong Kong; i.e., one interviewee provided the name of at least one more potential interviewee for recruitment, and so on. The inclusion criteria were as follows: (i) working as a nurse at a hospital or in other clinical settings; (ii) providing care to patients with confirmed/suspected COVID-19, and (iii) an ability to communicate in Cantonese.

2.2. Data collection

To guide each interview, a semi-structured interview guide with key questions and specific probes was developed by an expert panel. This panel included two professors, an assistant professor, and two postdoctoral fellows, all of whom had extensive experience in conducting qualitative research. We referenced the World Health Organization's definition of health, "Health is the state of complete physical, mental and social health, not just the absence of disease or infirmity" to develop our interview guide (18). Moreover, psychological distress is defined as a state of emotional distress caused by exposure to stressful events that pose a threat to an individual's physical or psychological wellbeing (19). In addition, according to a systematic review published in 2021, factors associated with psychological distress in healthcare workers during an infectious disease outbreak include: physical, psychological and social factors, work role and experience, coping styles, and organizational support (20). Therefore, the

guide ([Supplementary File 1](#)) focused on the following areas: (i) Nurses' general experience when taking care of patients with suspected/confirmed COVID-19; (ii) the impact of COVID-19 on their psychological; (iii) the impact of COVID-19 on their social and physical wellbeing; (iv) the impact of COVID-19 on their nursing role and practice; and (v) strategies employed to cope with the psychological distress. To ensure consistency, all interviews were conducted over the telephone by the co-first authors (ATC and LLKH) experienced in conducting qualitative interviews. ATC and LLKH are both females, registered nurses and have received training in conducting qualitative research during their postgraduate studies. The interviewers did not have any relationship established with the participants prior to study commencement. Eligible nurses were invited to attend the one-to-one semi-structured telephone interviews. Demographic data, including age, sex, marital status, education level, professional position, years of experience as a nurse, and work department, were collected before the start of the interview. Each interview was audio-recorded with the participants' consent. Data collection was conducted until data saturation was reached, indicating that the interviews no longer extracted new information ([21](#)).

2.3. Ethics considerations

This study involving human participants was reviewed and approved by The Survey and Behavioral Research Ethics Committee of the Chinese University of Hong Kong (reference no: SBRE-21-0773) and was conducted according to the tenets of the Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects. Prior to the study commencement, the purpose and process of the study were explained to all nurses. The nurses provided their written informed consent to participate in this study. The nurses were assured of complete anonymity and confidentiality of their data and received an explanation about their right to withdraw from the study at any point without stating a reason.

2.4. Data analysis

The qualitative data were transcribed verbatim and analyzed using thematic analysis ([22](#)). First, the two researchers (ATC and LLKH) read the transcripts line-by-line to familiarize themselves with the entire data set. Next, a set of initial codes was generated by systematically collating the data features. Codes with similar meanings were condensed and sorted to potential themes. The initial themes were then further reviewed to ensure internal coherence before finalizing a set of themes and subthemes. Any discrepancies in the coding decisions were resolved by further discussion with another researcher who checked the consistency

and coherence of the thematic codes to ensure that an agreement was reached.

2.5. Rigor and trustworthiness

To enhance the rigor and trustworthiness of the study, several strategies were employed. First, to minimize investigator bias during the data analysis, all researchers were interviewed by an independent expert to reflect on and report any predispositions that might affect the interpretation and presentation of the findings ([23](#)). Second, a reflexive journal was used to document the process and context throughout the research process to increase transparency ([24](#)). Third, to ensure the dependability of the findings, discussion among the research team during the data interpretation phase was continued until consensus on themes was reached ([25](#)). This study was reported following the Consolidation criteria for reporting qualitative research (COREQ) checklist ([26](#)) ([Supplementary File 2](#)).

3. Results

Twenty-nine nurses were approached, of which 22 (14 female and 8 male nurses; average age, 36.7 ± 8.5 years) nurses agreed to join the study (with a response rate of 75.9%) and were interviewed between June and July 2022. Interviews lasted 35–47 min. [Table 1](#) presents the demographic characteristics and clinical experiences of the participants. Four main themes emerged from the collected data.

3.1. Theme 1: Intense fear, worry, and anxiety

3.1.1. Subtheme 1.1: Fear of oneself and their family members contracting COVID-19

Many participants expressed their fear of contracting COVID-19 through close contact with hospitalized patients with COVID-19. They mentioned that they were exposed to a contaminated environment containing patients with confirmed COVID-19, potentially infected patients, and their colleagues (who also may have been infected). In particular, some participants were worried that they were at an increased risk of infection when their colleagues tested positive for COVID-19. Most of them felt anxious and feared the associated consequences.

“As an emergency nurse, I’m exposed to a high-risk environment when providing close direct care for patients. It’s inevitable to feel intense anxiety and worry about myself contracting COVID-19, particularly when I realized that

TABLE 1 Participants' demographic and work characteristics.

Characteristics	n (%)
Age (years)	
20–29	4 (18.2)
30–39	11 (50.0)
40–49	5 (22.7)
50–59	2 (9.1)
Sex	
Male	8 (36.4)
Female	14 (63.6)
Marital status	
Single	8 (36.4)
Married	14 (63.6)
Education attainment	
Bachelor's degree	7 (31.8)
Master's degree	12 (54.5)
Doctoral degree	3 (13.6)
Year of working experience	
1–5	3 (13.6)
6–10	9 (40.9)
11–15	3 (13.6)
>15	7 (31.8)
Position	
Registered nurse	13 (59.1)
Advanced practice nurse	7 (31.8)
Ward manager	1 (4.5)
Nurse consultant	1 (4.5)
Department unit	
Accident and emergency department	8 (36.4)
Isolation ward	3 (13.6)
Intensive care unit	4 (18.2)
Medical ward	3 (13.6)
Surgical ward	2 (9.1)
Others	2 (9.1)

my colleagues were confirmed [to be infected]. You know the infection may have multiorgan effects on our body.” Participant 5.

Most participants expressed their fear of infecting their family members or friends; therefore, they decided to move away from their families to minimize the risk of spreading the infection to their family members and loved ones.

“I was so worried that I would infect my family members and friends, and I decided to move into a duty room; during that critical moment, I was not at home to see my husband or my kids for nearly one month. It was first at Easter that I went back home as the number of hospitalized patients was gradually decreasing at that time.” Participant 16.

3.1.2. Subtheme 1.2: Worry and anxiety induced by resource shortages

All the participants highlighted their concerns about resource shortages, including the insufficient availability of personal protective equipment to minimize their exposure to infection at the workplace amid the COVID-19 outbreak. This resource shortage posed a threat to their physical and psychological wellbeing.

“There is inadequate protective gear, including N95 masks and personal protective equipment, to ensure our safety. Imagine you are required to enter airborne infection isolation rooms without adequate protective gear; we were only given surgical masks and face shields to protect ourselves at the time. How can we rest assured that we are safe under such conditions? We are working under threats and worry about the infection risk.” Participant 4.

Many participants described that there was a limited number of isolation wards and rooms with negative pressure to provide care to suspected/confirmed cases, hence inducing worry and anxiety.

“The surveillance/isolation wards were not well-established amid the Omicron surge. Due to the high case load, rooms with negative pressure were insufficient to accommodate the confirmed patients. My colleagues and I were all working with anxiety and worry.” Participant 15.

3.2. Theme 2: Feeling worn out and psychologically distressed

3.2.1. Subtheme 2.1: Mental exhaustion and distress due to the increased case load and staff shortage

Many participants described a substantial change in their usual health care operation scenario in response to the rapidly changing pandemic situation in January, with the highly contagious Omicron variant spreading through the community. Many participants experienced immense pressure in response to the evolving demands of COVID-19 in the clinical setting. Owing to the increasing number of older and critically ill patients with COVID-19 during the fifth wave,

all of the participants experienced worn out induced by the increased workload during each shift and ever-evolving COVID-19 protocols.

"I felt worn out as the Omicron outbreak ripped through the city. I work in a surveillance ward, which was responsible for accepting every patient admitted into the hospital for COVID-19 screening and triaging them to other wards after receiving their test results. At the beginning of the fifth wave, many infected people rushed to public hospitals to get treatment as the government advised them to do so. Every staff member was busy: we had to take care of around 16 patients alone, nearly double the number than usual; we could not manage to squeeze in time for lunch/dinner and even had no time for a toilet break throughout our shift." Participant 14.

Several participants mentioned that many of their colleagues were infected during the early stages of the Omicron outbreak, causing significant staff shortages. The health care professionals were physically and psychologically exhausted, which in turn resulted in intense distress and mental exhaustion.

"Due to the surge of the Omicron wave since late February, which was the toughest time we had experienced, there were increasing COVID cases among health care professionals, leading to staff shortages. There were at least 50,000 cases daily in early March, yet at least 10 staff members were being infected in my ward at that moment. In my hospital, there were at least 100 health care professionals infected. Because we originally had barely enough manpower in each shift, losing one or two of them would be very difficult for us. To manage their burden, we must work continuously; everyone was burning out." Participant 4.

Some participants described that due to the surge of the fifth wave of the pandemic, there was a rising rate of COVID-19 patients in hospitals, which has resulted in an overall increase in the workload of the health care professionals.

"I could still remember that nine of the 16 public hospitals had reached full occupancy in late March. I believe that both the health care professionals and patients have been stretched to the limit by the overloading capacity in hospitals with long waiting times. Hundreds of infected older adults in need of treatment and oxygen had no alternative but to stay in the A&E, in corridors, as there were no vacancies in the isolation/surveillance wards." Participant 1.

3.2.2. Subtheme 2.2: Feeling worthless, helpless, depressed, and frustrated

Most participants expressed that they felt worthless and helpless when they witnessed many patients with COVID-19 did

not receive prompt and appropriate care/treatment during the fifth wave.

"Frankly speaking, it's like a living hell. When seeing patients lying on the ground, you feel so helpless and worthless to offer care for them. They were like waiting to die, no food, no medicine, and no one was available to offer care for them." Participant 2.

Some participants exhibited feelings of depression and frustration when they were unable to provide quality care that met their own high standard to patients with confirmed/suspected COVID-19 due to the high workload.

"The outbreak was a mess. I felt upset and powerless; after 5 years of being a nurse, I suddenly felt like I knew nothing, I felt unable to help my patients. I broke down and cried, not for myself, but because of the pitiful sight of the patients. That really was the worst experience and most frustrating moment we all had." Participant 9.

"There were many older adults waiting in the cold weather in temporary holding areas outside hospitals, with delayed treatment. It's really unbearable and difficult; we feel like we could be doing more, and I know we can't. I felt like rubbish while working." Participant 11.

3.2.3. Subtheme 2.3: Lack of support and low job satisfaction

Some participants revealed that they did not feel understood or supported by their seniors, ward managers, or department heads. They had no opportunity to express their concerns, unmet needs, and expectations to the organization.

"I would expect our managers to spend time with us in the ward. Even if they do not help, they can just motivate us and support us. But they haven't; we feel lonely." Participant 20.

Many participants expressed that there was a lack of support for their wellbeing and workplace safety from the organization amid the fifth wave of COVID-19.

"Staff's safety and well-being should be the Hospital Authority's top priority. However, we don't feel it. The manager only asked us to wear N95 masks and gowns after the large-scale outbreak in the fifth wave; this never happened in advance as a precaution to protect staff." Participant 18.

Some were also concerned about the constantly changing treatment guidelines and policies, which made them feel overwhelmed and unsure as to how to adhere to those guidelines, posing negative impacts on the quality of patient care.

"We are disappointed with hospital authorities for their slow response and unclear staff instructions, guidelines, and protocols; these could change multiple times, which would lead to confusion among health care professionals. It would also affect patient care." Participant 19.

Some participants felt alienated from their profession and expressed that they may quit nursing and reconsider their career path due to low job satisfaction.

"I no longer wanted to continue in the nursing profession. I mean, I am discouraged by how the profession has been regarded." Participant 10.

"Many colleagues have left during the pandemic: some have emigrated to other countries, while some have moved to private hospitals. I am still making up my mind about whether to resign or not. I had low work satisfaction in the recent half year." Participant 4.

3.3. Theme 3: Impact on psychosocial and physical health

3.3.1. Subtheme 3.1: Reduced social life/activities

Many participants reported that they tended to stay and work at the hospital continuously and arranged a hotel-based isolation/quarantine during the fifth wave of the pandemic to minimize the risk of infecting their family members and friends.

"I have had nearly no social life since the fifth wave. I didn't go back home as I know I'm at high risk; I don't want to spread to others, so I chose to stay at a hotel after work." Participant 10.

Some revealed that in addition to the social distancing measures imposed by the government, the nature of their work further hampered their social life and activities during the pandemic.

"I never dated my friends when I was deployed to an isolation ward. I saw that my friends were hanging out with each other on the social media—they were so happy and I'm so lonely. No social life at all." Participant 2.

3.3.2. Subtheme 3.2: Perceived stigma of being a nurse and loneliness

Owing to the heightened fear among the public, some participants worried about being stigmatized or discriminated against because of being a health care professional during the COVID-19 pandemic. They perceived some forms of stigma in their daily life from their neighbors, partners, and friends, who

maintained an emotional distance from them. All of these factors induced a feeling of loneliness, which in turn jeopardized their psychosocial wellbeing.

"Some of my friends preferred not to gather during this critical moment, especially those with kids. They were worried about the risk of contracting the virus because of my job. Although I understand their viewpoints, I still feel upset." Participant 2

3.3.3. Subtheme 3.3: Muscle pain, migraine, fatigue, stomach pain, and sleep pattern disturbance

Most participants complained about physical discomforts, such as shoulder, neck, and back pain; migraine; and stomach pain after almost every shift. Some reported that these types of discomfort were mainly aftermath of the busy working conditions and the personal protective equipment (e.g., lack of oxygen when wearing N95 masks). Many participants stated that their sleep patterns were disrupted owing to the long shifts and heavy workload and that they always experienced insomnia and nightmares during this unprecedented period. They were craving a break and to take leave, even for a short time, to reset their mind and body.

"It's an experience I would compare to a world war; I worked like a nurse in the war, encountering busy work and urgent issues in every shift. I was very tired and experienced frequent and severe migraine that usually lasted more than 3 hours; I felt nauseous and stomach pain during migraine. All these impeded my thinking and daily activity." Participant 2.

"There was a tremendous disruption in my sleeping patterns. I always had insomnia and nightmares; my sleep quality is so poor. This has been the greatest impact on me since February." Participant 5.

3.4. Theme 4: Limited options to cope with psychological distress during the difficult times

3.4.1. Subtheme 4.1: Lack of psychological resources available from organizations

A majority of the participants felt that there was a lack of psychological support from their organizations or that they could not recognize the availability of such support. They mentioned that they felt helpless and that their seniors or supervisors were too busy to give them any support. Some of them revealed that they did not have time to even explore whether any organizational support was available and that they were unable to obtain any related information.

"I am not sure whether there are any psychological support services from the organization, at least I can't recognize them or have no time to explore." Participant 7.

"We all are very busy, and no one cares about your emotions, even your seniors or supervisors, because they are also occupied by a heavy workload." Participant 2.

3.4.2. Subtheme 4.2: Necessity to find ones' own ways to cope

Most of the participants expressed that the stressful working environment made them feel frustrated at times and that it was important for them to find their own ways to cope with the issues. The most reported coping strategies included video or phone calls with family and friends and chats with colleagues. They treasured the time spent with their family and friends, which provided them with a lot of psychological support. In addition to support from family and/or friends, some of them also found other coping strategies that could relieve their psychological distress (e.g., playing phone games, singing, writing diaries, or watching movies).

"As I work in the dirty team, I need to self-quarantine during or after work to protect my family and friends. Of course, I feel frustrated and lonely sometimes. Luckily, the advanced development of technology allows me to chat with my family and friends via video calls. This gives me the most support for continuing my work." Participant 8.

"I don't know what the proper way to cope with my stress is. Playing phone games is the only way for me to relieve my psychological distress." Participant 11.

4. Discussion

To the best of our knowledge, this is the first qualitative study that explored the psychological distress faced by nurses in Hong Kong during the fifth COVID-19 pandemic wave caused by the Omicron variant. The pandemic has not only affected public health and the global economy but also caused a remarkable mental health crisis (27–29), in which challenges faced by health care professionals are the greatest. Our findings revealed that nurses are highly vulnerable to COVID-19, given that the highly contagious Omicron variant has not only caused severe and far-reaching repercussions to the health care system but also detrimentally impacted the psychosocial health of nurses. Our findings highlighted that nurses experienced psychological distress amid the COVID-19 pandemic, including feeling worn out, stress, depression, anxiety, worry, fear, and frustration. These findings are consistent with those of previous studies, which imply that the psychological distress experienced by nurses may be largely attributable to the fear associated with the novel coronavirus disease, close personal exposure to

infected patients, and elevated stress when caring for patients with suspected/confirmed disease (13, 30). In particular, the findings are supported by a cohort study comprising 158,445 health care professionals and 229,905 of their household members which reported that the risk of hospital admission during the pandemic was 3 times and 2 times higher among the health care professionals and their household members, respectively, as compared with the general population (29). The increased infection risk to health care professionals and the risk of them transmitting the infection to the community could be one of the major factors that caused psychological distress among nurses, as shown in our findings. This pressing issue requires prompt attention from the concerned stakeholders to formulate policies that emphasize the importance of workplace safety and to reduce the occupational risks associated with the health care field and the resultant risk of transmission to health care professionals' families and the community at large.

Insufficient resources in the clinical setting, particularly the number of isolation facilities, availability of personal protective equipment, low work satisfaction, and lack of organizational support, may also be plausible causes of psychological distress among the nurses. Our findings showed that nurses caring for COVID-19 patients may develop fatigue, feeling worn out, anxiety, and mental exhaustion, which corroborates the findings of previous studies (12, 31–33). Another study similarly reported that health care professionals are prone to depression and post-traumatic stress symptoms owing to the COVID-19 pandemic (33). It is noteworthy that 90% of the health care professionals in Hong Kong with a high exposure risk in clinical settings reported mental health problems during the severe acute respiratory syndrome (SARS) outbreak in 2003 (34). Many nurses reported increased levels of anxiety, depression, and post-traumatic stress disorder after the SARS outbreak (35). Of note, some nurses who had been exposed to SARS still required prolonged treatment for their depression and post-traumatic stress symptoms (36). Despite the previous experience of such a large-scale public health crisis in Hong Kong, there is still a lack of resources and psychological support for health care professionals during the COVID-19 pandemic. Nurses still work under immense pressure amid the pandemic which jeopardizes their psychological wellbeing and may lead to compromised quality of care. This reflected that the ingrained problems in the healthcare system in the preparation for public health crises have not been solved since the SARS outbreak.

Offering psychological support is pivotal to addressing the unmet psychological needs of nurses worldwide and reducing their psychological distress during the pandemic, particularly when they are working under high levels of workplace stress. Consistent with findings in other countries (37, 38), our findings also underscore the pressing need for providing psychological support (especially from the organizations/government) for the nurses, as most nurses in this study reported lack of organizational support to cope with the psychological distress

during the pandemic. It is worth noting that such organizational support can empower the nurses and hence foster them to cope with the workplace stress more effectively, in addition to self-care and peer support. A multi-faceted approach is warranted to improve and optimize nurses' psychological health (37). This approach may include different components at different times, with strategies for prevention and treatment at various levels, including individual levels by further enhancing the ability of self-care and improving the availability of peer support; organizational levels by offering support or training to enhance the emotional wellbeing and mental health of nurses; and governmental levels by optimizing the health care policies (e.g., improving labor shortage in nurses). All these strategies can prepare nurses, hospitals, and governments for the future possible large-scale public health crisis.

In particular, to provide appropriate psychological support, hospitals should arrange psychological counselors to regularly visit the health care staff and listen to their concerns and stories (39). Meanwhile, it is crucial to enhance the resilience among health care professionals in the face of this public health crisis (40). Resilience, an important psychological construct, is regarded as one's ability to sustain psychological and physical wellbeing in the face of adversity by rebounding from hardship (41, 42). Prior studies have found that building resilience in nurses serves as a protective factor against many mental health problems, such as anxiety and depression, which in turn create beneficial patient outcomes (43, 44). Yet, psychological interventions that aim to foster or enhance psychological resilience in nurses are lacking worldwide (40). Indeed, organizations may provide resilience-promoting interventions for the nurses or other health care professionals to enhance their resilience level and psychological wellbeing amid the pandemic. Appropriate training and resources should also be provided to the nurses for enabling them to access supportive networks (40). For instance, the National Health Service in the United Kingdom offers a national outreach service to nurses for rapid access to mental health support (37). These organizational supports or outreach services could improve the coping ability and promote psychological wellbeing of nurses, especially during such a large-scale public health crisis.

The limitation of this study was the use of the snowball sampling technique to recruit registered nurses from public acute care hospitals, which may result in sampling bias.

5. Conclusion

The COVID-19 pandemic has caused widespread disruption of the global health care system and has affected the psychosocial wellbeing of nurses in Hong Kong. Our study findings may provide concerned stakeholders with useful insights into

reducing the psychological distress experienced by nurses in Hong Kong. Appropriate psychological interventions should be provided to improve the psychological wellbeing of the health care professionals amid 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 Survey and Behavioral Research Ethics Committee of the Chinese University of Hong Kong (reference no: SBRE-21-0773). The patients/participants provided their written informed consent to participate in this study.

Author contributions

AC, LH, and WL conceived and designed this study. AC and LH drafted the manuscript and conducted data analysis, with additional advice regarding analyses contributed by WL, JC, and GS. All authors contributed to the article and approved the submitted version.

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/fpubh.2022.1023302/full#supplementary-material>

References

- World Health Organization. WHO Coronavirus (COVID-19) Dashboard. (2022). Available online at: <https://covid19.who.int/> (accessed August 15, 2022).
- World Health Organization. Update on Omicron. (2021). Available online at: <https://www.who.int/news/item/28-11-2021-update-on-omicron> (accessed August 9, 2022).
- The Government of the Hong Kong Special Administrative Region. Coronavirus Disease (COVID-19) in HK. (2022). Available online at: <https://www.coronavirus.gov.hk/eng/index.html> (accessed August 15, 2022).
- Cheung T, Yip PS. Depression, anxiety and symptoms of stress among Hong Kong nurses: a cross-sectional study. *Int J Environ Res Public Health*. (2015) 12:11072–100. doi: 10.3390/ijerph120911072
- Burki T. Hong Kong's fifth COVID-19 wave-the worst yet. *Lancet Infect Dis*. (2022) 22:455–6. doi: 10.1016/S1473-3099(22)00167-0
- Cheung PH, Chan CP, Jin DY. Lessons learned from the fifth wave of COVID-19 in Hong Kong in early 2022. *Emerg Microbes Infect*. (2022) 11:1072–8. doi: 10.1080/22221751.2022.2060137
- Black JRM, Bailey C, Przewrocka J, Dijkstra KK, Swanton C. COVID-19: the case for health-care worker screening to prevent hospital transmission. *Lancet*. (2020) 395:1418–20. doi: 10.1016/S0140-6736(20)30917-X
- Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care*. (2020) 9:241–7. doi: 10.1177/2048872620922795
- Sasangohar F, Jones SL, Masud FN, Vahidy FS, Kash BA. Provider burnout and fatigue during the COVID-19 pandemic: lessons learned from a high-volume intensive care unit. *Anesth Analg*. (2020) 131:106–11. doi: 10.1213/ANE.0000000000004866
- World Health Organization. COVID-19: Occupational Health and Safety for Health Workers: Interim Guidance. (2022). Available online at: https://www.who.int/publications/i/item/WHO-2019-nCoV-HCW_advice-2021-1 (accessed October 12, 2022).
- Cénat JM, Blais-Rochette C, Kokou-Kpolou CK, Noorishad PG, Mukunzi JN, McIntee SE, et al. Prevalence of symptoms of depression, anxiety, insomnia, posttraumatic stress disorder, and psychological distress among populations affected by the COVID-19 pandemic: a systematic review and meta-analysis. *Psychiatry Res*. (2021) 295:113599. doi: 10.1016/j.psychres.2020.113599
- Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to Coronavirus Disease 2019. *JAMA Netw Open*. (2020) 3:e203976. doi: 10.1001/jamanetworkopen.2020.3976
- Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: a cross-sectional study. *Psychiatry Res*. (2020) 288:112936. doi: 10.1016/j.psychres.2020.112936
- Chau JPC, Lo SHS, Saran R, Leung CHY, Lam SKY, Thompson DR. Nurses' experiences of caring for people with COVID-19 in Hong Kong: a qualitative enquiry. *BMJ Open*. (2021) 11:e052683. doi: 10.1136/bmjopen-2021-052683
- Heydarikhayat N, Ghanbarzhi N, Shahkaramzhi Z, Sabagh K, Rohani C. Nurses' lived experiences of caring for patients with COVID-19: a phenomenological study. *J Res Nurs*. (2022) 27:313–27. doi: 10.1177/17449871221079175
- Karimi Z, Fereidouni Z, Behnammoghadam M, Alimohammadi N, Mousavizadeh A, Salehi T, et al. The lived experience of nurses caring for patients with COVID-19 in Iran: a phenomenological study. *Risk Manag Healthc Policy*. (2020) 13:1271–8. doi: 10.2147/RMHP.S258785
- Sun N, Wei L, Shi S, Jiao D, Song R, Ma L, et al. A qualitative study on the psychological experience of caregivers of COVID-19 patients. *Am J Infect Control*. (2020) 48:592–8. doi: 10.1016/j.ajic.2020.03.018
- World Health Organization. Definition of Health. Available online at: <https://www.publichealth.com.ng/world-health-organizationwho-definition-of-health/> (accessed November 3, 2022).
- Drapeau A, Marchand A, Beaulieu-Prévost D. Epidemiology of psychological distress. In: Labate L, editor. *Mental Illnesses: Understanding, Prediction and Control*. London: IntechOpen (2012).
- Sirois F M, Owens J. Factors associated with psychological distress in health-care workers during an infectious disease outbreak: a rapid systematic review of the evidence. *Front Psychiatry*. (2021) 11:589545. doi: 10.3389/fpsy.2020.589545
- Saunders B, Sim J, Kingstone T, Baker S, Waterfield J, Bartlam B, et al. Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quant*. (2018) 52:1893–907. doi: 10.1007/s11135-017-0574-8
- Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. (2006) 3:77–101. doi: 10.1191/1478088706qp0630a
- Shenton AK Strategies for ensuring trustworthiness in qualitative research projects. *Educ Inf*. (2004) 22:63–75. doi: 10.3233/EFI-2004-22201
- Olmos-Vega FM, Stalmeijer RE, Varpio L, Kahlke R. A practical guide to reflexivity in qualitative research: AMEE guide no. 149. *Med Teach*. (2022) 7:1–11. doi: 10.1080/0142159X.2022.2057287
- Lincoln YS. *Naturalistic Inquiry*. In: Lincoln YS, Guba EG, editors. Beverly Hills, CA: Sage Publications. (1985).
- Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. (2007) 19:349–57. doi: 10.1093/intqhc/mzm042
- Cheung AT, Li WHC, Ho LLK, Chan GCF, Chung JOK. Health support to pediatric cancer survivors and their families during the COVID-19 pandemic. *Pediatr Blood Cancer*. (2020) 67:e28441. doi: 10.1002/pbc.28441
- Ho LLK, Li WHC, Cheung AT, Xia W, Wang MP, Cheung DYT, Lam TH. Impact of COVID-19 on the Hong Kong youth quiltline service and quitting behaviors of its users. *Int J Environ Res Public Health*. (2020) 17:8397. doi: 10.3390/ijerph17228397
- Shah ASV, Wood R, Gribben C, Caldwell D, Bishop J, Weir A, et al. Risk of hospital admission with coronavirus disease 2019 in healthcare workers and their households: nationwide linkage cohort study. *BMJ*. (2020) 371:m3582. doi: 10.1136/bmj.m3582
- Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ*. (2020) 368:m1211. doi: 10.1136/bmj.m1211
- Wang J, Okoli CTC, He H, Feng F, Li J, Zhuang L, et al. Factors associated with compassion satisfaction, burnout, and secondary traumatic stress among Chinese nurses in tertiary hospitals: a cross-sectional study. *Int J Nurs Stud*. (2020) 102:103472. doi: 10.1016/j.ijnurstu.2019.103472
- Shanafelt T, Ripp J, Trockel M. Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. *JAMA*. (2020) 323:2133–4. doi: 10.1001/jama.2020.5893
- Xiang YT, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry*. (2020) 7:228–9. doi: 10.1016/S2215-0366(20)30046-8
- Chua SE, Cheung V, Cheung C, McAlonan GM, Wong JW, Cheung EP, et al. Psychological effects of the SARS outbreak in Hong Kong on high-risk health care workers. *Can J Psychiatry*. (2004) 49:391–3. doi: 10.1177/070674370404900609
- Thompson DR, Lopez V, Lee D, Twinn S. SARS—a perspective from a school of nursing in Hong Kong. *J Clin Nurs*. (2004) 13:131–5. doi: 10.1046/j.1365-2702.2003.00884.x
- Liu X, Kakade M, Fuller CJ, Fan B, Fang Y, Kong J, et al. Depression after exposure to stressful events: lessons learned from the severe acute respiratory syndrome epidemic. *Compr Psychiatry*. (2012) 53:15–23. doi: 10.1016/j.comppsy.2011.02.003
- Smith GD, Bradbury-Jones C, Gelling L, Neville S, Pandian V, Salamonson Y, et al. Addressing the mental health of nurses during the COVID-19 pandemic: time for support. *J Clin Nurs*. (2022) 26:16383. doi: 10.1111/jocn.16383
- Melnik BM, Hsieh AP, Davidson J, Carpenter H, Choffet A, Heath J, et al. Promoting nurse mental health. *Am Nurse J*. (2021) 16:20–2.
- Chen SH, Liu JE, Bai XY, Yue P, Luo SX. Providing targeted psychological support to frontline nurses involved in the management of COVID-19: An action research. *J Nurs Manag*. (2021) 29:1169–79. doi: 10.1111/jonm.13255
- Smith GD, Ng F, Ho Cheung Li W. COVID-19: Emerging compassion, courage and resilience in the face of misinformation and adversity. *J Clin Nurs*. (2020) 29:1425–8. doi: 10.1111/jocn.15231
- Luthar SS, Cicchetti D, Becker B. The construct of resilience: a critical evaluation and guidelines for future work. *Child Dev*. (2000) 71:543–62. doi: 10.1111/1467-8624.00164
- Davydov DM, Stewart R, Ritchie K, Chaudieu I. Resilience and mental health. *Clin Psychol Rev*. (2010) 30:479–95. doi: 10.1016/j.cpr.2010.03.003
- Baskin RG, Bartlett R. Healthcare worker resilience during the COVID-19 pandemic: an integrative review. *J Nurs Manag*. (2021) 29:2329–42. doi: 10.1111/jonm.13395
- Labrague LJ, De Los Santos JAA. COVID-19 anxiety among front-line nurses: Predictive role of organisational support, personal resilience and social support. *J Nurs Manag*. (2020) 28:1653–61. doi: 10.1111/jonm.13121



OPEN ACCESS

EDITED BY

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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

RECEIVED 26 August 2022

ACCEPTED 13 January 2023

PUBLISHED 02 March 2023

CITATION

Pahrol MA, Ismail R, Mohamad N, Lim YC,
Muhamad Robat R, Rajendiran S, Syed Abu
Thahir S, Abdul Shakor AS, Ramly N and
Shaharudin R (2023) Concerns, perceived
impact, practices, preventive measures, and
stress among healthcare workers during
COVID-19 pandemic in Malaysia.
Front. Public Health 11:1028443.
doi: 10.3389/fpubh.2023.1028443

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Concerns, perceived impact, practices, preventive measures, and stress among healthcare workers during COVID-19 pandemic in Malaysia

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Introduction: Healthcare workers (HCWs) have been continually exposed to patients with COVID-19 and are at higher risk of contracting the disease. Their psychological health is important for overall wellbeing and productivity, which could lead to a reduction in human errors during the pandemic crisis. This study aimed to measure the level of concerns, work practices, adequacy of preventive measures among HCWs, and the impacts on their life and work, including mental health status during the second wave of the COVID-19 pandemic in Malaysia.

Methods: An online questionnaire was distributed randomly to 1,050 HCWs from the Ministry of Health facilities in the Klang Valley who were involved directly in managing or screening COVID-19 cases from May to August 2020. The questionnaire was divided into five domains, which were concerns, impact on life and work, practice, perceived adequacy of preventive measures, and Revised Impact of Event Scale (IES-R). Logistic regression was used to identify sociodemographic predictors of the five domains.

Results: A total of 907 respondents (86.4%) participated in this survey. Approximately half of the respondents had a low concern (50.5%), most of them had a good practice (85.1%), with 67.5% perceiving there were adequate preventive measures, and they perceived the outbreak had a low impact (92%) on their life and work. From the IES-R domain, 18.6% of respondents potentially suffered from post-traumatic stress disorder (PTSD).

Conclusion: During the second wave of the COVID-19 outbreak in Malaysia, HCWs practiced high levels of precautions and preventive measures because they were aware of the risk of infection as an occupational hazard. With the adequate implementation of policy and control measures, the psychological wellbeing of the majority HCWs remained well and adequately supported.

KEYWORDS

healthcare workers, concerns, perceived impact, practices, preventive measures, stress, COVID-19 pandemic

1. Introduction

COVID-19 cases remain high worldwide, with approximately 6.5 million new cases reported in 7 days as of July 2022. The World Health Organization (WHO) warned of setbacks and new hurdles in changing viral variants and the need to gird for the epidemic to persist for a few more years (1). The first local case was detected in January 2020, demarcating the first wave of COVID-19 in Malaysia (2). In March 2020, Malaysia issued its first nationwide mobility control order due to a sharp rise in cases following the second wave of COVID-19 (3). Klang Valley, a two-federal territory and six-district metropolitan conglomeration on Peninsular Malaysia's west coast, had the most COVID-19 instances that accounted for nearly 40% of the national cases, and it was declared a Red Zone when the infection rose to more than 40 instances per day (2). The Ministry of Health Malaysia (MOH) has strategized the national COVID-19 prevention and control activities (i.e., contact tracking, close contact screening, handling, and monitoring suspected, verified, and under surveillance cases). Although all public and private healthcare facilities were deployed to tackle this epidemic, the public sector received a heavier workload and burden (4). Two public tertiary hospitals in the Klang Valley were designated as COVID-19 hospitals to exclusively manage active COVID-19 cases and provide critical care services for them. While close contact screening and surveillance activities were conducted by the primary care services involving HCWs from district health offices and health clinics.

During disease outbreaks, HCWs being the first responders are at greater risk of being exposed to biological hazards and contracting the disease. A meta-analysis of studies conducted in China, the United States, and Italy reported that more than 10% of all patients with COVID-19 were HCWs (5). In Malaysia, the incidence risk ratio of HCWs acquiring COVID-19 was nearly three times higher than the general population (6). Therefore, the risk of contracting COVID-19 infection from their workplace and the possibility of extending the risk to their family and close acquaintances were the most frequent concerns among HCWs (7, 8). In addition, the sociodemographic and occupational characteristics of the healthcare workers (HCWs) played a role in their level of concern. Higher age, post-graduate education, and working as a doctor were found to be associated with high concern during previous disease outbreaks (9). However, a previous study related to the severe acute respiratory syndrome (SARS) outbreak found that healthcare assistants were more concerned about their family's and others' health as compared to doctors (10).

With regard to COVID-19's impact on HCWs' life, a study reported that more than 50% HCWs felt stigmatized in various life domains such as quality of life, social contacts, and self-esteem previous studies (11). Another study among nursing professionals

found that only 12–24% of nurses had perceived a high impact of COVID-19 on their life and family members. Nevertheless, their perceived impacts on work were reported to be slightly higher at 40–46% (8). The perceived impact of COVID-19 to work could be differed by job category. A study among HCWs in a teaching hospital showed that doctors had a higher perceived impact on working compared to nurses (12). Furthermore, another study related to the pandemic reported that HCWs' perceived impact on work was related to increased workload and the need to work overtime, especially in healthcare settings with high incidences of COVID-19 cases (13, 14).

In addition, good work practices toward COVID-19 and compliance with infection prevention control (IPC) were reinforced as key considerations for occupational safety and health (15). Earlier studies among HCWs showed good practices, and IPC compliance varied between 22 and 65% (16–18). There have been increased practices since the pandemic. However, more training sessions were needed on using personal protective equipment (PPE) and case management, including treatment (19, 20). Therefore, a systematic review was done on 20 studies that reported a higher median (78.8%) for good practices among HCWs associated with the type of profession, experience, age, level of education, use of personnel protective equipment, and gender (21).

Correspondingly, the level of preparedness among HCWs is crucial in building an appropriate response to the COVID-19 pandemic. These include strategic planning by providing support and education, offering prompt and authoritative information, and easing anxiety before an outbreak. A study of HCWs following the Avian Influenza pandemic in Singapore showed that most of them felt prepared regarding the availability of an informed workplace preparedness plan and regular infection control activities and the influenza vaccination program provided by the employer (14). HCWs in healthcare facilities that admit and actively manage confirmed cases of COVID-19 are at risk of contracting and transmitting the disease to their family members and others. Hence, compliance with the guidelines and policies on infection prevention control and occupational safety and health is essential to ensure their preparedness and protection from physical and psychological health risks.

Apart from concerns, perceived impact, practices, and preventive measures, there were also psychosocial impacts from long working hours leading to distress, fatigue, and occupational burnout (15). In addition to the increased workload during the screening and management of patients, the requirement to wear full PPE may have contributed to a stressful work environment that could impact the staff's mental health. A previous study in Canada concluded that HCWs who worked in hospitals treating SARS cases were prone to experience burnout, psychological distress, and post-traumatic stress compared to those who worked in the hospital with no SARS-related cases (22). A study conducted in a tertiary hospital in Taiwan reported similar findings that HCWs who treated patients in emergency settings during the SARS outbreak developed more severe post-traumatic stress disorder (PTSD) symptoms than staff in the psychiatric department (23). Many studies have found that HCWs directly exposed to patients with COVID-19 in their clinical settings were associated with a high risk of PTSD symptoms and other psychological disorders during the pandemic (24–26).

Given the scarcity of local evidence, it is crucial to assess the psychological health risk among HCWs who have been involved in COVID-19 management in Malaysia since the pandemic began.

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COVID-19, coronavirus disease 2019; HCW, healthcare workers; ICU, intensive care unit; IES-R, Revised Impact of Event Scale; IPC, infection protection control; MERS, Middle East respiratory syndrome; MOH, Ministry of Health Malaysia; MREC, Malaysian Research Ethical Committee; NIH, National Institutes of Health; OR, odd ratio; PPE, personal protective equipment; PTSD, post-traumatic stress disorder; SARS, severe acute respiratory syndrome; SD, standard deviation; SPSS, Statistical Package for the Social Science software; WHO, World Health Organization.

While previous studies addressed the psychological outcomes among HCWs within hospital settings, our study looked into exposures from different job categories and healthcare settings (i.e., hospital, clinic, and health office). This study will provide information on the current HCWs' situation during the outbreak and serve as a reference for monitoring the preparedness and psychological aspects of HCWs in the event of a disease outbreak in a developing country. The exposure of HCWs to COVID-19 infection at workplace may increase their concerns, impact their personal and professional lives, perceive good practices and adequate preventive measures, and impact their mental health. Certain sociodemographic (i.e., age, ethnicity, and family characteristics) and occupational (i.e., nature of work, job category, and workplace settings) factors may influence HCWs' perception and psychological outcomes during this pandemic. Thus, this study aimed to measure concerns, practices, perceived impact, preventive measures, and stress among HCWs as well as describe the associated sociodemographic and occupational factors.

2. Methods

2.1. Study design and area

This is a cross-sectional study conducted from May to August 2020 in three different settings of public healthcare facilities under the MOH in Klang Valley. The Klang Valley area, also known as Greater Kuala Lumpur, covers the Federal Territories of Kuala Lumpur and Putrajaya, as well as six districts in Selangor State, including Petaling, Klang, Gombak, Hulu Langat, Sepang, and Kuala Langat. This study was conducted in 103 public healthcare facilities that manage COVID-19 cases, consisting of 10 hospitals, 13 district health offices, and 80 health clinics.

2.2. Sampling method

The list of HCWs involved with COVID-19-related activities during the second wave of the COVID-19 pandemic was obtained from the Occupational Health Unit of each state health department in Klang Valley. The inclusion criteria for respondents in this study were HCWs who had a risk of direct or indirect exposure to COVID-19 while handling and managing patients with COVID-19 for at least 7 days during the study period. The term direct exposure used in this study referred to the case definition on the MOH guidelines for COVID-19 management in Malaysia, which is defined as a person who has exposure to a probable or confirmed case within 1 m and for at least 15 min (27). While for exclusion criteria, HCWs in government healthcare facilities outside Klang Valley and other government healthcare facilities, which are not involved in screening and managing COVID-19 cases, were excluded.

A total of 6,736 HCWs fulfilled the criteria and were eligible to participate in this study. The COVID-19-related activities in healthcare facilities vary according to the work's nature. HCWs in hospitals who were mostly working in the emergency department, intensive care unit (ICU), and wards were exposed to COVID-19 during the admission process, which persisted throughout patients' stay until discharge. Since the MOH designated only a few hospitals for managing in-patient COVID-19 cases at the time of this study, all HCWs in the specified departments were

included. Whereas, HCWs from district health offices were involved in various public health and clinical work such as contact tracing, patient screening, triaging, and conducting field investigations on COVID-19 cases and clusters. They could be exposed during sample swabbing activities, transporting, and transferring confirmed cases to designated hospitals. These exposures were apparent during managing large COVID-19 clusters that required mass screening.

In this study, the questionnaire was self-administered using an online survey tool in the form of bilingual (English and Malay language). Each selected respondent will be given an ID number to ensure anonymity. The respondent can answer the questionnaires online *via* computers or mobile phones. Participants will take ~10–15 min to complete the questionnaire. The questionnaire will be distributed to selected healthcare facilities. Participation will be voluntary and anonymous. The consent form and research information have been included in the online questionnaire. The respondent must select "agree and continue" to consent to the study. Once all questionnaires had been filled online, automatically, the data were recorded in a spreadsheet in an analyzable format and allowed for tabulation and graphical representations.

All 6,736 eligible HCWs from 103 healthcare facilities were coded and listed in Microsoft Excel. A random number was then generated to select 1,050 participants, and the invitation to participate in this study was emailed to them. We received 923 responses, of which 907 respondents had completed the questionnaire, and only 16 declined to participate.

2.3. Study tool

The questionnaire was adapted from previous studies on SARS, avian flu, and Middle East respiratory syndrome (MERS) outbreaks (9, 14, 28). The questionnaire was structured into two parts: The first part collected sociodemographic data on respondents, occupations, and family history. The next part consisted of 54 items that were divided further into five domains: (i) concerns about their involvement in managing the pandemic, (ii) practices of control measures in workplace settings, (iii) perception regarding the adequacy of implemented preventive measures, (iv) impact of COVID-19 to personal and professional lives, and (v) psychological impact of COVID-19 of stress (PTSD).

The responses in the first four domains on concerns, the practice of control measures, perceived preventive measures, and the COVID-19 impact were assessed using a Likert scale with 1- or 4-point ordinal points (strongly disagree = 1, disagree = 2, agree = 3, and strongly agree = 4). All points from each domain were summed up and then classified into two categories based on the total point percentage, which include low or high concern and impact, poor or good practice, and inadequate or adequate preventive measures. The percentage score of 75% and above was used as a cutoff between those two categories. The cutoff point has been chosen for capturing more samples and giving meaningful results. These first four domains were validated at the onset of the study involving 220 samples. Cronbach's alpha coefficients were between 0.740 and 0.917 for all the domains (29). The details of each of the first domains are described later.

- The first domain was about concerns by HCWs regarding COVID-19. The questionnaire included 14 work-related items

(nine items) and non-work-related items (five items). It was used to measure the perceived risk of contracting COVID-19 disease through their exposure at the workplace, and the risk of transmitting it to people close to them.

- The second domain focused on infection control prevention practices among HCWs. The questionnaire included 15 items, including availability and adherence to the infection control protocols, and compliance with personal protection equipment (PPE).
- The third domain was about the implementation of preventive measures at the workplace. The questionnaire included eight items on the provisions to protect HCWs through infection control measures, implementation of clear policies and protocols of infection control at the workplace, and about staff adherence.
- The fourth domain measures the impact of COVID-19 on the HCWs' personal (three items) and works life (four items), including perceived social stigmatization and issues at the workplace, such as conflict, stress, and high workload.

The last domain was on the psychological impact of COVID-19 using 10 items from the Revised Impact of Event Scale (IES-R). The IES-R was chosen to assess psychological impact by reviewing the degree of distress among respondents (30). The rationale for choosing IES-R was due to short, self-administered questionnaires that can be answered by those individuals exposed to traumatic events regardless of their health status. Moreover, the criteria delineated in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) to assess PTSD were incorporated in the questions (31). It reviewed the intrusive and avoidance symptoms at least 7 days after HCWs were exposed to COVID-19 cases, and the components are interpreted as a total score to be used for preliminary diagnosis of PTSD. We used 10 items questionnaire to assess four intrusion items, five avoidance items, and one hyperarousal item (32). This last domain was assessed according to the original scale of 0- or 5-point ordinal points that range from "not at all" to "extremely" (33). The interpretation of 10 items questionnaire for a total score of 15 and more is categorized as "more likely" to have PTSD. Those who scored <15 were grouped into "less likely" to have PTSD. This IES-R domain was already validated for both languages (29, 30, 32). The scale of having internal consistency can be implied when Cronbach's alpha is higher than 0.7. Cronbach's alpha for the three subdomains ranged from 0.87 to 0.92 (31).

2.4. Study analysis

The analysis was carried out using Statistical Package for the Social Science software (SPSS) version 24.0. Categorical data were described by frequency and percentage distribution, while continuous data were described using mean and standard deviation (SD). Logistic regression analysis was performed between each sociodemographic variable with all five domains to identify the covariates for the best-fit model. Variables with a $p < 0.25$ were selected and included in the final model (34). A multivariate analysis was conducted using binomial logistic regression with the selected variables to calculate the adjusted odds ratio (AOR) with a 95% confidence interval (95%CI). The dependent

variables chosen in logistic regression were high concern and impact, good practice, adequate preventive measures, and more likely to have PTSD coded as 1. A $p < 0.05$ was considered statistically significant.

2.5. Ethics consideration

Ethics approval is required before the commencement of research within the MOH's healthcare facilities and involving HCWs. The Medical Research and Ethics Committee (MREC) approved the ethical study under reference number KKM/NIHSEC/P20-715(6). All participants were anonymous, with no personal identifiers in any part of the analysis or report. Respondents who consented could proceed to the next part of the online survey and were required to answer all questions before submission. Participants who refused were excluded from further analysis.

3. Results

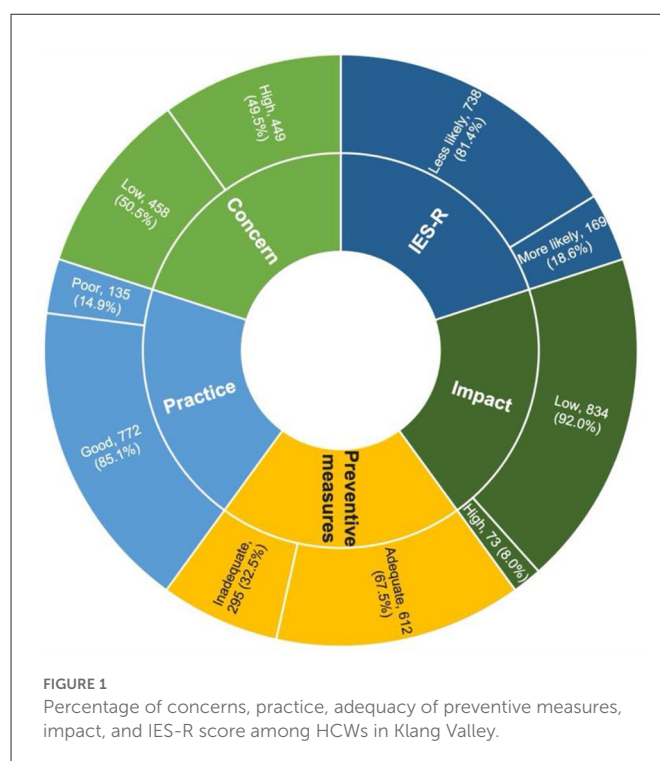
A total of 1,050 HCWs were randomly selected to participate in this online survey, and the response rate was 86.4%, involving 907 respondents. As shown in Table 1, the majority of respondents were women (62.6%), Malay ethnicity (80.7%), and married (73.2%) with children (64.8%). Most respondents were between 30 and 39 years old (51.8%) with a mean \pm SD age of $33.71 \pm$ SD 6.684 years. In terms of the workplace, more than half of the respondents were from health clinics (56.1%), followed by hospitals (27.9%) and district health offices (16%). Approximately one-third of respondents were allied health staff (33.6%) with a duration of work of more than 5 years (67.1%). In addition, most of the respondents had direct contact with COVID-19 confirmed cases at their workplace (86.1%), with more than one-quarter of them having frequent contact of more than 3 days per week (25.6%). Most of the respondents have low concern (50.5%), good work practice (85.1%), perceived adequate preventive measures (67.5%), and low impact (92%), as shown in Figure 1. For the IES-R domain, the majority (81.4%) of respondents were less likely to suffer from PTSD. The details of respondents' responses according to each item for concerns, practice, preventive measures, impact, and IES-S are tabulated in Supplementary material.

Table 2 shows that five out of nine variables had a $p < 0.25$ based on univariate analysis: ethnicity, number of children, facility type, profession, and frequency of direct contact. Based on ethnicity, Indian respondents were 2.4 times more likely to score higher practice than Malay respondents (95% CI 1.03–5.70, $p < 0.05$). The odds for Chinese and others ethnicity for more likely PTSD were two times higher than Malay and Indian. Respondents with more than three children had two times higher odds of perceived adequate preventive measures than respondents with no child (95% CI 1.16–3.70, $p < 0.05$). Based on facility type, respondents from health clinics had 30% more odds of perceived adequate preventive measures than respondents from hospitals (95% CI 0.97–1.83, $p < 0.05$). Respondents from district health offices had two times the odds of having "more likely PTSD" as respondents from the hospital (95% CI 1.13–3.03, $p < 0.05$). Based on profession, nurses and allied health staff had 2- and 1.6-times higher odds for high perceived

TABLE 1 Distribution of respondents based on the demographical and occupational characteristics.

Variables	n (907)	%
Gender		
Male	339	37.4
Female	568	62.6
Age		
Below 30 years old	292	32.2
30–39 years old	470	51.8
40 and above	145	16.0
Ethnicity		
Malay	732	80.7
Chinese	50	5.5
Indian	85	9.4
Others	40	4.4
Marital status		
Single	234	25.8
Ever married	673	74.2
No. of child		
No child	319	35.2
1–3 children	506	55.8
More than 3 children	82	9.0
Healthcare facilities		
Hospital	253	27.9
Health clinic	509	56.1
District health office	145	16.0
Profession		
Doctors	297	32.7
Nurses	258	28.4
Allied health staffs	305	33.6
Others	47	5.2
Years of service		
<3 years	111	12.2
3–5 years	187	20.6
6–10 years	325	35.8
>10 years	284	31.3
Direct contact frequency		
No direct contact	191	21.1
6–7 days a week	209	23.0
3–5 days a week	275	30.3
>3 days a week	232	25.6

adequate preventive measures compared to doctors (95% CI 1.38–2.85, 95% CI 1.15–2.26, $p < 0.05$). The odds of “high concern” were much higher with increased frequency of direct contact. For



respondents with frequent direct contact with patients with COVID-19 (6–7 days a week), the odds of high concern, high work practice, and perceived adequate preventive measures were nearly 2–3 times higher compared to respondents with no direct contact.

The binomial logistic regression analysis between all domains with sociodemographic variables found that ethnicity, type of healthcare facilities, professions, years of service, and frequency of direct contact with patients with COVID-19 were fitted in the final model, as shown in Table 2. The Hosmer-Lemeshow test was not significant for all the models ($p > 0.05$), and the classification table showed that the overall model was correctly classified with a percentage of more than 70%. From the analysis, the respondents with a direct contact frequency of 6–7 days a week had higher odds of having higher concern, good practice, perceived adequate preventive measures, and higher impact than respondents with a direct contact frequency of <6 days a week.

From the IES-R domain, the respondents with more than three children had 56% fewer odds of having PTSD. Based on occupational factors, nurses are two times more likely to suffer from PTSD compared to other professions (95% CI 1.13–2.99, $p < 0.05$). Meanwhile, respondents from the district health office were two times more likely to suffer from PTSD than hospital HCWs (95% CI 1.25–3.64, $p < 0.05$). The odds of using PPE were higher among nurses and allied health staff (1.8 and 1.5 times, respectively), than among doctors. Chinese respondents had two times the odds of likely suffering from PTSD compared to Malay respondents (95% CI 1.16–4.69, $p < 0.05$). Respondents with direct contact with patients with COVID-19 (6–7 days a week) had three times the odds for high concern and 2.5 times the odds for high impact compared to the respondent with no direct contact (95% CI 1.98–4.68, 95% CI 1.08–5.57, $p < 0.05$).

TABLE 2 Sociodemographic and occupational factors associated with concern, practice, preventive measure, impact, and IES-R domain.

Variables	Concern		Practice		Preventive measure		Impact		IES-R	
	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
Ethnicity										
Malay	1	1	1	1	1	1	1	1	1	1
Chinese	1.04 (0.58–1.84)	1.23 (0.66–2.28)	1.35 (0.56–3.25)	1.09 (0.43–2.78)	0.43* (0.24–0.77)	0.58 (0.31–1.07)	1.86 (0.80–4.31)	1.63 (0.64–4.10)	2.02* (1.07–3.81)	2.33* (1.16–4.69)
Indian	0.52* (0.33–0.83)	0.58* (0.35–0.96)	2.43* (1.03–5.70)	2.40 (0.99–5.85)	0.72 (0.45–1.14)	0.97 (0.59–1.60)	0.42 (0.13–1.36)	0.39 (0.11–1.32)	0.93 (0.51–1.70)	1.14 (0.59–2.18)
Others	0.87 (0.46–1.64)	1.04 (0.53–2.03)	0.64 (0.29–1.37)	0.72 (0.32–1.62)	0.59 (0.31–1.12)	0.59 (0.30–1.15)	1.27 (0.44–3.68)	1.43 (0.47–4.32)	2.02* (1.00–4.08)	1.62 (0.78–3.39)
No. of children										
No child	1	1	1	1	1	1	1	1	1	1
1–3 children	1.23 (0.93–1.62)	1.29 (0.95–1.76)	0.76 (0.51–1.14)	0.82 (0.53–1.26)	1.11 (0.83–1.49)	0.94 (0.68–1.30)	1.02 (0.61–1.70)	0.92 (0.52–1.62)	0.75 (0.53–1.06)	0.77 (0.52–1.12)
>3 children	0.99 (0.61–1.60)	0.96 (0.57–1.62)	1.23 (0.57–2.64)	1.23 (0.55–2.73)	2.07* (1.16–3.70)	1.59 (0.87–2.92)	0.73 (0.27–1.97)	0.62 (0.22–1.74)	0.43* (0.21–0.90)	0.44* (0.20–0.95)
Facility type										
Hospital	1	1	1	1	1	1	1	1	1	1
Health clinic	1.04 (0.77–1.40)	1.22 (0.87–1.71)	0.71 (0.45–1.14)	0.83 (0.50–1.38)	1.33 (0.97–1.83)	1.39 (0.98–1.98)	1.41 (0.79–2.51)	1.68 (0.89–3.19)	1.05 (0.70–1.57)	1.11 (0.71–1.73)
District health office	0.61* (0.39–0.92)	0.65 (0.42–1.01)	0.38* (0.22–0.65)	0.45* (0.25–0.81)	1.09 (0.71–1.67)	1.17 (0.74–1.85)	0.92 (0.39–2.12)	1.21 (0.50–2.93)	1.85* (1.13–3.03)	2.13* (1.25–3.64)
Profession										
Doctors	1	1	1	1	1	1	1	1	1	1
Nurses	1.38 (0.99–1.93)	1.16 (0.81–1.68)	0.97 (0.59–1.60)	1.08 (0.63–1.85)	1.99* (1.38–2.85)	1.81* (1.22–2.68)	1.27 (0.72–2.25)	1.18 (0.63–2.21)	1.38 (0.89–2.12)	1.84* (1.13–2.99)
Allied health staffs	1.27 (0.92–1.76)	1.13 (0.79–1.62)	0.68 (0.43–1.07)	0.81 (0.49–1.33)	1.61* (1.15–2.26)	1.48* (1.02–2.15)	0.64 (0.34–1.22)	0.56 (0.28–1.12)	1.36 (0.89–2.06)	1.42 (0.89–2.29)
Others	1.07 (0.58–1.98)	0.83 (0.43–1.62)	0.42* (0.19–0.87)	0.51 (0.23–1.13)	1.64 (0.84–3.20)	1.43 (0.71–2.86)	1.01 (0.34–3.05)	0.86 (0.27–2.76)	0.93 (0.39–2.20)	1.13 (0.46–2.79)
Direct contact frequency										
None	1	1	1	1	1	1	1	1	1	1
6–7 days a week	2.78* (1.85–4.16)	3.04* (1.98–4.68)	1.75* (1.02–3.01)	1.84* (1.04–3.28)	1.68* (1.11–2.55)	1.77* (1.14–2.76)	1.92 (0.87–4.20)	2.45* (1.08–5.57)	0.99 (0.59–1.68)	1.01 (0.59–1.75)
3–5 days a week	1.71* (1.18–2.49)	1.69 (1.15–2.49)	1.46 (0.89–2.38)	1.44 (0.87–2.38)	1.48* (1.00–2.17)	1.54* (1.03–2.29)	1.73 (0.81–3.71)	1.87 (0.86–4.06)	1.28 (0.79–2.06)	1.38 (0.84–2.25)
>3 days a week	1.39 (0.94–2.05)	1.41 (0.94–2.12)	1.61 (0.96–2.71)	1.75 (1.02–3.00)	1.38 (0.93–2.06)	1.47 (0.97–2.23)	1.62 (0.73–3.56)	1.67 (0.74–3.75)	1.06 (0.64–1.75)	1.09 (0.65–1.83)

High concern, good practice, adequate preventive measures, high impact, and more likely to have PTSD (IES-R) coded as 1. OR, odd ratio; AOR, adjusted odd ratio; *indicates a significant $p < 0.05$.

4. Discussion

The COVID-19 pandemic has affected and greatly burdened the healthcare system, particularly the frontline workers. HCWs were the most affected, as they faced emerging unknown infectious diseases. At the same time, they carried on the duty to deliver health services and treatment to others. This study was done when the burden of new COVID-19 cases in Malaysia started to climb in Klang Valley, and the proportion of HCWs became less compared to patients. This study found that approximately 50% of respondents have a low concern, good practice (85.1%), with perceived adequate preventive measures (67.5%), and perceived low impact (92%) on their life and work from managing the COVID-19 pandemic. However, <20% of the respondents were more likely to suffer from PTSD. Our study further indicated that the frequency of direct contact with patients with COVID-19 influences the odds of having high concern, high work practice, and perceived adequate preventive measures. This result might highlight the preparedness and resilience of the HCWs in facing the pandemic.

During the COVID-19 pandemic, HCWs were at risk of getting infected while working due to constant exposure (35). Their major involvement with screening and providing treatment at all levels of healthcare institutions puts them at risk of contracting the disease. MOH Malaysia was very proactive and issued frequently updated guidelines on managing COVID-19 cases and infection protection control (IPC) measures. Therefore, even before the study was conducted, HCWs were diligent in preventive measures as they were trained and updated with the latest guidelines. Nearly all (96.7%) respondents agreed that the policies and protocols implemented were timely and easy to follow. On the other hand, it was suggested that lack of proper PPE training would increase the risk of HCWs exposure in the workplace (36). Our study showed more that 95% agreed that there were adequate training for PPE applications and supplies. This finding is varied in other countries. For example, in Australia, most of their emergency clinicians (77.6–86.4%) reported receiving specific training and education on COVID-19, including PPE usage (37). While in North Central Ethiopia, only half (49.8%) of their healthcare providers were prepared for the COVID-19 pandemic (38).

Almost half of the respondents had great concerns about the risk of infection and mostly had good practices on wearing full PPE and compliance with SOPs. Hospitals and health clinics had higher concerns compared to those working in the district health office, as their scope of work in these facilities involved direct close contact with patients and constant exposure throughout their shifts. HCWs involved with clinical work in hospitals and health clinics during the pandemic had a higher prevalence of stress, fear, and anxiety compared to HCWs in non-clinical settings (39). More than 85% of our respondents showed concerns about the possibility of transmitting the infection to their family members and friends due to the nature of their work as compared to other studies (39, 40). The frequency of direct contact with patients with COVID-19 had shown to be the predictor for higher concern and impact. This is most likely because they were at a higher risk of infection than those with less contact with patients with COVID-19. However, the time of exposure influences the risk of infection. If exposure to patients with COVID-19 occurred on day 2 or 3, the risk of contracting the disease is higher (41). Similar findings were also shown in other infectious disease

outbreaks, of which daily contact and exposure were more likely to have a higher psychological impact and concern (9, 28, 39). Another study also reported that the degree of contact with COVID-19 cases was directly related to mental health illness (42).

Healthcare workers working at the district health office had significantly less practice than others. This is most likely because they did not directly examine or attend to the patient. Instead, they are practically more involved in community-based surveillance (43). Furthermore, HCWs working with the district health office are less concerned than respondents from the other two types of healthcare facilities. However, their IES-R scores were high, indicating that they were more likely to suffer from PTSD. This could be due to an increased workload due to a lack of human resources. To address this issue, the government directed that healthcare personnel be deployed to various healthcare facilities facing a manpower shortage. This is echoed by data published by the National Institutes of Health Malaysia (NIH), a total of 128 personnel, primarily medical officers from health institutes, have been mobilized to various healthcare facilities. During the study period, 44 health personnel were mobilized to the district health office (34%) and 12 to hospitals in the Klang Valley (44).

In this study, staff nurses and allied health personnel were significantly more likely than doctors to implement preventive measures. Although, according to the qualitative research conducted by Efsthathiou et al. among nurses, factors such as the high risk of infection and vulnerability to disease were the reasons for preventive measure implementation. The benefits of taking preventative measures make them feel calm while attending to patients, according to the same study (45). This is echoed by a study in Palestine, where almost 92% of the nurses used preventive measures while handling patients with COVID-19 (46). However, this study found that nurses are more likely to develop PTSD. These findings can be supported by the high level of stress that they encountered during the pandemic. PTSD is caused by traumatic events and can further lead to other psychological disorders. HCWs are responsible in taking care of COVID-19 patient with longer contact time, thus, increase their risk of infection (26). This might lead as a contributing factor for them being more likely to adhere to preventive measures, but at the same time, becoming a burden on their mental health (24). Most staff nurses in Malaysia were female. It has been supported that female participants were at high risk of developing mental disorders in most infectious disease outbreak studies (47–49).

Most HCWs in the study also showed a low prevalence of impact despite increased workload and additional hours worked during the pandemic. The likely reason for this could be the adequate physical and emotional support they received. In the area of perceived adequate preventive measures, most of them agreed (91.5%) that they received emotional support when they needed help. Regarding family support, the study found that those with more children were 56% less likely to have PTSD. These findings suggest that those with more family members have better mental wellbeing. Some healthcare workers may avoid the community or family when working in COVID-19 facilities. Therefore, connecting with their relatives or trusted people can strengthen their moral support (50). However, some studies have found that healthcare workers' fear of infection and possible infection of their family members may contribute to psychological distress associated with a pandemic (22, 51, 52).

Therefore, further evaluation is needed to explore more factors that might contribute to the result.

Among the study's limitations was that the respondents from different backgrounds in healthcare settings contributed to this study. They have different roles and job tasks that might have different types of exposure to COVID-19. HCWs in hospitals were aware of their exposure as their settings already have proper planning and preparedness such as proper PPE, isolation rooms, and proper triage settings for any infectious disease and COVID-19. While in health clinics and district health offices, they have unknown exposures and need to be always cautious as their settings need better equipment and proper plan like the hospital does. These might affect their overall exposure to COVID-19 and influence the result of the five domains quantified in this study. On the other hand, the HCWs had time constraints to participate and complete the survey. However, most of the respondents at that time were actively involved and occupied in managing COVID-19 cases. Response to the study was good among HCWs from hospitals and health clinics but relatively poor (41.4%) among HCWs working in the district health office. This could be attributed to the heavy workload at healthcare facilities during the peak of the second wave of COVID-19, where the management of COVID-19 from the screening process, contact tracing, and swab sampling to transporting patients to hospitals was taking place. As mentioned earlier, the shortage of staff from the district health office might have led to poor response due to limitations in answering the questionnaire. Apart from that, this study was only conducted in the Klang Valley area and might not represent the whole of Malaysia. However, most of the COVID-19 cases were detected and admitted to Klang Valley healthcare facilities during the data collection.

5. Conclusion

In conclusion, the majority HCWs had good work practices and perceived adequate preventive measures as they were aware of their exposure and risk of getting infected. Furthermore, our study found that HCWs with frequent direct contact with the patient were more likely to have high concerns and impacts on their personal and social life when managing COVID-19 cases. However, their psychosocial wellbeing remains well-supported as no associations were found with PTSD. Therefore, worksite health promotion programs to address COVID-19 concerns should focus on HCWs with higher COVID-19 exposure risks. With the implementation of policy and control measures, the psychological wellbeing of HCWs remains supported, and the prevalence of mental health illness can be reduced.

Data availability statement

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

Ethics statement

This study involving human participants was reviewed and approved by the Medical Research and Ethics Committee (MREC),

Ministry of Health Malaysia [KKM/NIHSEC/ P20-715 (7)]. The patients/participants provided their written informed consent to participate in this study.

Author contributions

MAP, RI, NM, RMR, SR, SSAT, ASAS, and NR participated in the data acquisition. MAP, YCL, and RI analyzed the data and interpreted the results. MAP, RI, RMR, YCL, and RS wrote the manuscript. All the authors were involved in the conception and design of the research, critically revised the manuscript, and read and agreed to the published version of the manuscript.

Funding

This study was funded by the MOH under the Sustainable Environment and Climate Change Research Cluster, Grant No. JPP-20-030.

Acknowledgments

The authors would like to thank the Director General of Health Malaysia for his permission to publish this article and the Director of the Institute for Medical Research for the tremendous support. In addition, we acknowledge the National Institutes of Health (NIH) Ministry of Health Malaysia for approving this research protocol under the identification NMRR-20-591-54211. We also thank members of the Occupational and Environmental Health Unit from all healthcare facilities and the Biostatistics Research Consultation Clinic, NIH, for their cooperation and support during data acquisition and analysis.

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/fpubh.2023.1028443/full#supplementary-material>

References

- World Health Organization. *Weekly Epidemiological Update on COVID-19 - 23 March 2021*. Geneva: World Health Organization (2021). Available online at: <https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19-23-march-2021> (accessed March 29, 2021).
- Ministry of Health Malaysia. *Situasi Semasa Jangkitan Penyakit Coronavirus 2019 (Covid-19) Di Malaysia 13 Mac 2020*. Putrajaya: Kementerian Kesihatan Malaysia (KKM) (2020). Available online at: https://www.moh.gov.my/index.php/database_stores/attach_download/337/1353 (accessed August 14, 2020).
- Shah AUM, Safri SNA, Thevadas R, Noordin NK, Rahman AA, Sekawi Z, et al. COVID-19 outbreak in Malaysia: actions taken by the Malaysian government. *Int J Infect Dis*. (2020) 97:108–16. doi: 10.1016/j.ijid.2020.05.093
- Tan CS, Lokman S, Rao Y, Kok SH, Ming LC. Public and private sectors collective response to combat COVID-19 in Malaysia. *J Pharm Policy Prac*. (2021) 14:40. doi: 10.1186/s40545-021-00322-x
- Sahu AK, Amrithanand VT, Mathew R, Aggarwal P, Nayer J, Bhoi S. COVID-19 in health care workers – a systematic review and meta-analysis. *Am J Emer Med*. (2020) 38:1727–31. doi: 10.1016/j.ajem.2020.05.113
- Harith AA, Ab Gani MH, Griffiths R, Abdul Hadi A, Abu Bakar NA, Myers J, et al. Incidence, prevalence, and sources of COVID-19 infection among healthcare workers in hospitals in Malaysia. *Int J Environ Res Public Health*. (2022) 19:12485. doi: 10.3390/ijerph191912485
- Sahashi Y, Endo H, Sugimoto T, Nabeta T, Nishizaki K, Kikuchi A, et al. Worries and concerns among healthcare workers during the coronavirus 2019 pandemic: a web-based cross-sectional survey. *Hum Soc Sci Commun*. (2021) 8:41. doi: 10.1057/s41599-021-00716-x
- Galletta M, Piras I, Finco G, Meloni F, D'Aloja E, Contu P, et al. Worries, preparedness, and perceived impact of covid-19 pandemic on nurses' mental health. *Front Public Health*. (2021) 9:566700. doi: 10.3389/fpubh.2021.566700
- Abolfotouh MA, AlQarni AA, Al-Ghamdi SM, Salam M, Al-Assiri MH, Balkhy HH. An assessment of the level of concern among hospital-based healthcare workers regarding MERS outbreak in Saudi Arabia. *BMC Infect Dis*. (2017) 17:4. doi: 10.1186/s12879-016-2096-8
- Wong TW, Yau JKY, Chan CLW, Kwong RSY, Ho SMY, Lau CC, et al. The psychological impact of severe acute respiratory syndrome outbreak on healthcare workers in emergency departments and how they cope. *Euro J Emerg Med*. (2005) 12:13–8. doi: 10.1097/00063110-200502000-00005
- Radhakrishnan RV, Jain M, Mohanty CR, Jacob J, Shetty AP, Stephen S, et al. The perceived social stigma, self-esteem, and its determinants among the health care professionals working in India during COVID 19 pandemic. *Med J Armed Forces India*. (2021) 77:S450–8. doi: 10.1016/j.mjafi.2021.01.017
- Saurabh K, Ranjan S. Preparedness, perceived impact and concerns of health care workers in a teaching hospital during coronavirus disease 2019 (COVID-19). *J Family Med Prim Care*. (2020) 9:4247–51. doi: 10.4103/jfmpc.jfmpc_799_20
- Carmassi C, Dell'Oste V, Barberi FM, Bertelloni CA, Pedrinelli V, Dell'Osso L. Mental health symptoms among general practitioners facing the acute phase of the COVID-19 pandemic: detecting different reaction groups. *Int J Environ Res Public Health*. (2022) 19:4007. doi: 10.3390/ijerph19074007
- Wong TY, Koh GC, Cheong SK, Lee HY, Fong YT, Sundram M, et al. Concerns, perceived impact and preparedness in an avian influenza pandemic—a comparative study between healthcare workers in primary and tertiary care. *Ann Acad Med Singap*. (2008) 37:96–102.
- WHO. *Coronavirus Disease (COVID-19) Outbreak: Rights, Roles and Responsibilities of Health Workers, Including Key Considerations for Occupational Safety and Health: Interim Guidance, 19 March 2020*. World Health Organization (2020). Available online at: <https://apps.who.int/iris/handle/10665/331510> (accessed January 22, 2022).
- Mohamad N, Pahrol MA, Shaharudin R, Md Yazin NKR, Osman Y, Toha HR, et al. Compliance to infection prevention and control practices among healthcare workers during COVID-19 pandemic in Malaysia. *Front Public Health*. (2022) 10:878396. doi: 10.3389/fpubh.2022.878396
- Bahegwa RP, Hussein AK, Kishimba R, Hokororo J, German C, Ngowi R, et al. Factors affecting compliance with infection prevention and control standard precautions among healthcare workers in Sogwe region, Tanzania. *Infect Prev Pract*. (2022) 4:100236. doi: 10.1016/j.infpip.2022.100236
- Patwary MM, Hossain MdR, Sultana R, Dazhamyar AR, Parsa AD, Kabir R, et al. Knowledge, attitudes and practices of healthcare professionals toward the novel coronavirus during the early stage of COVID-19 in a lower-and-middle income country, Bangladesh. *Front Public Health*. (2022) 10:988063. doi: 10.3389/fpubh.2022.988063
- Mbamalu O, Surendran S, Nampoothiri V, Bonaconsa C, Edathadathil F, Zhu N, et al. Survey of healthcare worker perceptions of changes in infection control and antimicrobial stewardship practices in India and South Africa during the COVID-19 pandemic. *IJID Regions*. (2022) 6:90–8. doi: 10.1016/j.ijregi.2022.11.010
- Mantes J, Pandya-Orozco BP. Implementing infection prevention and control (IPC) practices including COVID-19 mitigation strategies in a skilled nursing facility. *Am J Infect Cont*. (2022) 50:S17. doi: 10.1016/j.ajic.2022.03.091
- Tegegne GT, Kefale B, Engidaw MT, Degu A, Tesfa D, Ewunetei A, et al. Knowledge, attitude, and practice of healthcare providers toward novel coronavirus 19 during the first months of the pandemic: a systematic review. *Front Public Health*. (2021) 9:606666. doi: 10.3389/fpubh.2021.606666
- Maunder R, Lancee W, Balderson K, Bennett J, Borgundvaag B, Evans S, et al. Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. *Emerg Infect Dis*. (2006) 12:1924–32. doi: 10.3201/eid1212.060584
- Lin C, Peng Y, Wu Y, Chang J, Chan C, Yang D. The psychological effect of severe acute respiratory syndrome on emergency department staff. *Emerg Med J*. (2007) 24:12–7. doi: 10.1136/emj.2006.035089
- Buselli R, Corsi M, Baldanzi S, Chiumiento M, Del Lupo E, Dell'Oste V, et al. Professional quality of life and mental health outcomes among health care workers exposed to SARS-CoV-2 (Covid-19). *Int J Environ Res Public Health*. (2020) 17:6180. doi: 10.3390/ijerph17176180
- Carmassi C, Pedrinelli V, Dell'Oste V, Bertelloni CA, Cordone A, Bouanani S, et al. Work and social functioning in frontline healthcare workers during the covid-19 pandemic in Italy: role of acute post-traumatic stress, depressive and anxiety symptoms. *Riv Psichiatr*. (2021) 56:189–97. doi: 10.1708/3654.36346
- Carmassi C, Foghi C, Dell'Oste V, Cordone A, Bertelloni CA, Bui E, et al. PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: what can we expect after the COVID-19 pandemic. *Psychiatry Res*. (2020) 292:113312. doi: 10.1016/j.psychres.2020.113312
- Ministry of Health Malaysia. *Guidelines COVID-19 Management in Malaysia No. 4/2020 (updated on 26 February 2020)*. Putrajaya: Ministry of Health Malaysia (2020).
- Koh D, Lim MK, Chia SE, Ko SM, Qian F, Ng V, et al. Risk perception and impact of severe acute respiratory syndrome (SARS) on work and personal lives of healthcare workers in Singapore: what can we learn? *Med Care*. (2005) 43:676–82. doi: 10.1097/01.mlr.0000167181.36730.cc
- Ameerah Su'ad AS, Muhammad Alfatih P, Nurfatehar R, Sakshaleni R, Syahidiah SAT, Rafiza S, et al. Reliability and factor analyses of a questionnaire measuring concerns and perceptions of health care workers in Malaysia towards COVID-19 pandemic. *IMRJ*. (2022) 8.
- Weiss DS. The impact of event scale: revised. In: Wilson JP, Tang CS, editors. *Cross-Cultural Assessment of Psychological Trauma PTSD*. Boston, MA: Springer (2007). p. 219–38. doi: 10.1007/978-0-387-70990-1_10
- Sharif Nia H, Kaur H, Fomani FK, Rahmatpour P, Kaveh O, Pahlevan Sharif S, et al. Psychometric properties of the impact of events scale-revised (IES-R) among general Iranian population during the COVID-19 pandemic. *Front Psychiatry*. (2021) 12:692498. doi: 10.3389/fpsy.2021.692498
- Norhayati MM, Aniza AA. *Psychometric Properties of the Malay version of Impact of Event Scale - Revised (IES-R)*. Undefined. (2014). Available online at: <https://www.semanticscholar.org/paper/Psychometric-Properties-of-the-Malay-version-of-Mn-Aa/3033ec481b37a9bf3e3df677ddb63ce0db2b4fe3> (accessed June 23, 2022).
- Weiss DS, Marmar CR. The impact of event scale—revised. In: Wilson JP, Keane TM, editors. *Assessing Psychological Trauma PTSD*. New York, NY: The Guilford Press (1997). p. 399–411. doi: 10.1037/t12199-000
- Bendel RB, Afifi AA. Comparison of stopping rules in forward “stepwise” regression. *J Am Stat Assoc*. (1977) 72:46–53. doi: 10.1080/01621459.1977.10479905
- Nguyen LH, Drew DA, Graham MS, Joshi AD, Guo C-G, Ma W, et al. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. *Lancet Public Health*. (2020) 5:e475–83. doi: 10.1011/2020.04.29.20084111
- Puro V, Nicastri E. SARS and the removal of personal protective equipment. *CMAJ*. (2004) 170:930. doi: 10.1503/cmaj.1031700
- Li C, Sotomayor-Castillo C, Nahidi S, Kuznetsov S, Considine J, Curtis K, et al. Emergency clinicians' knowledge, preparedness and experiences of managing COVID-19 during the 2020 global pandemic in Australian healthcare settings. *Austral Emerg Care*. (2021) 24:186–96. doi: 10.1016/j.auec.2021.03.008
- Birihane BM, Bayih WA, Tesfahun Y, Munye T, Alemu AY, Belay DM. Health care provider's risk perception, and preparedness towards COVID-19 pandemic in North Central Ethiopia, 2020. *Heliyon*. (2021) 7:e06610. doi: 10.1016/j.heliyon.2021.e06610
- Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: a cross-sectional study. *Psychiatry Res*. (2020) 288:112936. doi: 10.1016/j.psychres.2020.112936
- Ng BH, Nuratiqah NA, Faisal AH, Soo CI, Low HJ, Najma K, et al. A descriptive study of the psychological experience of health care workers in close contact with a person with COVID-19. *Med J Malaysia*. (2020) 75:485–9.
- Ge Y, Martinez L, Sun S, Chen Z, Zhang F, Li F, et al. COVID-19 transmission dynamics among close contacts of index patients with COVID-19: a population-based

- cohort study in Zhejiang province, China. *JAMA Intern Med.* (2021) 181:1343–50. doi: 10.1001/jamainternmed.2021.4686
42. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry.* (2020) 7:e14. doi: 10.1016/S2215-0366(20)30047-X
43. Najwa LZ, Ima NZ, Wan MK, Haslinda NI, Syaifinaz IS, Hasneezah H, et al. *The Concept of District Health Management in Malaysia. Int J Public Health Clin Sci.* (2016) 3. Available online at: <http://publichealthmy.org/ejournal/ojs2/index.php/ijphcs/article/view/260> (accessed December 30, 2022).
44. Muhammad Nur Amir AR, Binti Amer Nordin A, Lim YC, Binti Ahmad Shauki NI, Binti Ibrahim NH. Workforce mobilization from the national institutes of health for the ministry of health Malaysia: A COVID-19 pandemic response. *Front Public Health.* (2021) 9:26. doi: 10.3389/fpubh.2021.574135
45. Efstathiou G, Papastavrou E, Raftopoulos V, Merkouris A. Factors influencing nurses' compliance with standard precautions in order to avoid occupational exposure to microorganisms: a focus group study. *BMC Nurs.* (2011) 10:1. doi: 10.1186/1472-6955-10-1
46. Shawahna R. Knowledge, attitude, and use of protective measures against COVID-19 among nurses: a questionnaire-based multicenter cross-sectional study. *BMC Nursing.* (2021) 20:163. doi: 10.1186/s12912-021-00689-x
47. Alonzi S, La Torre A, Silverstein MW. The psychological impact of preexisting mental and physical health conditions during the COVID-19 pandemic. *Psychol Trauma.* (2020) 12:S236–8. doi: 10.1037/tra0000840
48. Fiorillo A, Sampogna G, Giallardo V, Del Vecchio V, Luciano M, Albert U, et al. Effects of the lockdown on the mental health of the general population during the COVID-19 pandemic in Italy: results from the COMET collaborative network. *Eur Psychiatry.* (2020) 63:e87. doi: 10.1192/j.eurpsy.2020.89
49. Somma A, Gialdi G, Krueger RE, Markon KE, Frau C, Lovallo S, et al. Dysfunctional personality features, non-scientifically supported causal beliefs, and emotional problems during the first month of the COVID-19 pandemic in Italy. *Pers Individ Dif.* (2020) 165:110139. doi: 10.1016/j.paid.2020.110139
50. World Health Organization. *Mental Health and Psychosocial Considerations During the COVID-19 Outbreak, 18 March 2020.* World Health Organization (2020). Available online at: <https://apps.who.int/iris/handle/10665/331490> (accessed July 6, 2022).
51. Tam CWC, Pang EPF, Lam LCW, Chiu HFK. Severe acute respiratory syndrome (SARS) in Hong Kong in 2003: stress and psychological impact among frontline healthcare workers. *Psychol Med.* (2004) 34:1197–204. doi: 10.1017/S0033291704002247
52. Beauregard N, Marchand A, Blanc M-E. What do we know about the non-work determinants of workers' mental health? A systematic review of longitudinal studies. *BMC Public Health.* (2011) 11:439. doi: 10.1186/1471-2458-11-439



OPEN ACCESS

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SPECIALTY SECTION

This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Public Health

RECEIVED 19 September 2022

ACCEPTED 07 March 2023

PUBLISHED 30 March 2023

CITATION

Alsaheed D, Al-Ozairi A, Alsarraf H,
Albarrak F and Al Ozairi E (2023) Are we ready
for the next pandemic? Lessons learned from
healthcare professionals' perspectives during
the COVID-19 pandemic.

Front. Public Health 11:1048283.

doi: 10.3389/fpubh.2023.1048283

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Are we ready for the next pandemic? Lessons learned from healthcare professionals' perspectives during the COVID-19 pandemic

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Background: The mental health and wellbeing of people watching the Corona Virus Disease 2019 (COVID-19) pandemic unfold has been discussed widely, with many experiencing feelings of anxiety and depression. The state of mental health of medical staff on the frontlines providing care should be examined; medical staff are overworked to meet the demands of providing care to the rise in cases and deterioration in capacity to meet demands, and this has put them under great psychological pressure. This may lead to an increase in medical errors, affect quality of care, and reduce staff retention rates. Understanding the impact the pandemic has had on healthcare professionals is needed to provide recommendations to prepare for future crises.

Objectives: To be able to meet the needs of the medical workforce on the frontlines and inform psychological support interventions and strategies for future pandemics, we aim to identify and explore the psychological impact of COVID-19 in Kuwait on healthcare professionals in close contact with patients.

Methods: Using semi-structured interviews, we conducted interviews between February and July 2021 with 20 healthcare professionals across Ministry of Health hospitals who were part of COVID teams. Interviews were transcribed verbatim, and analysis was conducted using principles of thematic framework analysis.

Results: Three themes emerged to help prepare future healthcare frontline workers on an individual, organizational, and national level: enhance self-resilience, a better-equipped workforce and healthcare environment, and mitigate stigma and increase public awareness.

Conclusion: The results have assisted in highlighting areas of improvement to support the healthcare workforce in the current environment, as well as better prepare them for future pandemics. The findings have also provided insight to recommend targeted interventions. These should improve the psychological wellbeing and help in supporting healthcare professionals to reduce burnout, continue effective care of patients, and enhance resilience.

KEYWORDS

COVID-19, psychological impact, healthcare professionals, resilience, qualitative study

1. Introduction

Since the end of 2019, the emergence and spread of the SARS-COV-2 virus has reached pandemic proportions. What began as a fairly contained outbreak in the city of Wuhan in China has now been classified as a worldwide pandemic, with trends in cases and deaths increasing alarmingly. The Corona Virus Disease 2019 (COVID-19), caused by the SARS-COV-2 virus, is characterized by severe acute respiratory symptoms. Severe symptoms may lead to death as a result of respiratory failure (1, 2). A variety of public health and social measures have been put in place and regularly updated to limit the spread of this insidious virus, but the uptake of these measures have not been consistent worldwide, with countries adopting various combinations at different times. Curfews, social distancing, relegating work to home, and virtual education are examples of such measures, which have been successful in gradually decreasing the trend of new cases and deaths. According to the World Health Organization (WHO) there have been 755,703,002 confirmed cases and 6,836,825 deaths worldwide attributed to COVID-19, as of 13th February 2023 (3).

The psychological impact of COVID-19 has been significant worldwide. The mental health and wellbeing of people watching this pandemic unfold and those forced to stay at home has been discussed widely, such as experiencing feelings of anxiety and depression (4–7). Pooled data from a review and meta-analysis of 50 studies showed that the highest morbidity was poor sleep quality (40%), followed by stress and psychological distress (34%), anxiety and depression (26%) (8). Pooled prevalence rate of psychological morbidities with respect to impact of event due to COVID-19 pandemic was 44% (95%CI: 42% to 47%). The burden of these psychological morbidities was highest among COVID-19 patients, followed by healthcare workers and the general population. The prevalence of depression is 7-times higher than what was reported in 2017, indicating the huge impact COVID-19 has on people's mental health (9).

The prevalence of mental health disorders in healthcare professionals (HCPs) has been on the rise, even prior to the COVID-19 pandemic (10). Studies have also shown the dire impact that previous epidemics and pandemics have had on the psychological wellbeing of HCPs, with acute stress disorder, depression, anxiety, burnout, and post-traumatic stress disorder being experienced (11–14). The COVID-19 pandemic has compounded on the already fragile mental health of HCPs, worsening their quality of life and leading to burnout, which has detrimental effects on patient care (15). Professional burnout occurs when staff experience chronic stress in the workplace (16), and this has been heightened further by the COVID-19 pandemic (17). A recent systematic review and meta-analysis looking at the impact of the COVID-19 pandemic on HCPs' mental health found that 32% suffered from post-traumatic symptoms, 33% from depression, 37% from burnout, 40% from acute stress, 42% from anxiety, and 42% from insomnia (18). A variety of risk factors that can negatively impact HCPs mental health have been identified during the pandemic, such as the lack of personal protective equipment (PPE), concerns about their family's welfare, and fear of contagion (19).

In Kuwait, earlier cases were associated with imported cases only, but this was soon overtaken by cases of local transmission due to people not following strict preventative measures put in place. To tackle this, some areas have been cordoned off and the government updated measures regularly during the course of the pandemic. As of

February 13th 2023, Kuwait has seen a total of 662,858 cases and 2,570 total deaths since the start of the pandemic. At the peak of the pandemic, the Ministry of Health (MoH) called upon HCPs working in the private sector to assist in fighting this disease in order to meet the rising demands. Prior to the pandemic, there were many resignations of HCPs, with many more following at the height of the pandemic due to burnout; this led to shortage of staff and an increase in workload on those still working.

One aspect that requires further attention is the state of mental health of medical staff on the frontlines providing care to those suffering from COVID-19; this needs addressing on multiple levels to mitigate against long-term effects (20, 21). Medical staff are overworked to meet the demands of providing care to the rise in cases, and this has put them under great psychological pressure (22–25) draining them both physically and emotionally. The rates of depression and anxiety in physicians in China and across the world have skyrocketed (23, 26) and being in quarantine is the highest predictor for acute stress disorder (6).

With the upsurge of new cases and the deterioration in capacity to meet these demands in Kuwait during the pandemic, patients and medical staff suffered from psychological pressure. The impact of psychological distress on HCPs tackling this disease may be dire, and may increase medical errors, affect quality of care, and reduce staff retention rates. Burnout in HCPs working in Kuwait has been found to be alarmingly common (27), and it is imperative to identify how this has been compounded due to the pandemic. Burnout has physical and emotional manifestations, such as mental and physical exhaustion, feelings of disillusionment, anger, headaches, and hypertension (28). In addition, HCPs in Kuwait reported high levels of anxiety and depression (29, 30). There are many underlying rationales for the rise of mental health issues; fear and uncertainty leading to irrational behaviors, and peoples' altered perception of risk due to the delay of detection and the novelty of the virus have contributed to this rise (6). Furthermore, there was a shortage of adequate PPE and of investigations and treatment. The media also played a pivotal role, with important local figures disparaging the efforts of the MoH in Kuwait, and by extension the HCPs involved, for example spreading reports about incidents at different hospitals, while the HCPs were striving to do their best. Fearmongering and misinformation were rapidly spread, and this therefore increased anxiety; examples of this in Kuwait were the spread of messages about various herbal cures, the use of hydroxychloroquine as a treatment, how people were contracting the virus and dying, and the shortage in swabs for testing.

Although there were previous epidemics in neighboring countries, such as the Middle East Respiratory Syndrome (MERS) in Saudi Arabia (31), there was little impact of this in Kuwait. The COVID-19 pandemic would be considered the first major crisis experienced by HCPs in Kuwait. There is a need to fully understand and explore the psychological impact the COVID-19 pandemic had on frontline medical staff; these were unprecedented circumstances where difficult decisions had to be made in an ever-evolving environment and psychological support is essential. By identifying and exploring how COVID-19 impacted HCPs in Kuwait, informed targeted support can be recommended and plans put in place to prepare the healthcare workforce for ongoing demands of working in the healthcare context, and for times of additional demands such as a future pandemic response.

2. Methods

Qualitative methods using semi-structured interviews were chosen. Purposive sampling was used to fulfil our objectives; physicians who were directly in contact with patients diagnosed with COVID-19 who were being provided care in MoH hospitals were eligible. Physicians were approached by AO, who is a neuropsychiatrist, and his team of psychiatrists; Kuwaiti and non-Kuwaiti physicians were included to provide a diverse perspective on experiences. Potential participants were provided information about the study by the interviewers; this was then followed by the consent procedure. Recruitment continued until data saturation was reached; iterative analysis ensured this was achieved (32).

The MoH hospitals are public sector hospitals which are nationally funded and provide care to all catchment areas; sampling was conducted from all general hospitals which cover internal medicine and had the most influx of COVID-19 patients. This ensured a representative sample across national hospitals.

Interviews were chosen rather than online questionnaires as they elicit in-depth information from participants. Interviews were either conducted through video-calls *via* the Zoom application to overcome any quarantine regulations, or through audio-recording. Zoom for Healthcare is a cloud-based video-conferencing tool with the ability to securely record and store content as aligned with the Health Insurance Portability and Accountability Act (HIPAA) standards. This tool has been used in other qualitative healthcare research successfully (33). Using video over regular phone calls was chosen as this allows the interviewer (a psychiatrist) to observe their facial expressions to add context, and be able to respond to their concerns accordingly, such as any psychological distress felt during the interview. Limitations of this data collection method may include technological issues and a possible negative impact on establishing rapport (34), although other work comparing it with different methods found it simpler and more convenient (33).

Participants may encounter distress when reliving their experiences during the interview; this was mitigated as the interviewer is a psychiatrist who is able to address any distress accordingly. As the interviewers are psychiatrists who are part of a telepsychiatry service, participants can call at any time to discuss any further issues that may arise later. Participants were reassured that all information is kept anonymous and confidential to protect their identity.

Data protection was guaranteed through various measures. The interview recordings were saved on one account, which is a hospital-provided account under AO's name; internal access was only provided by him. The video files were recorded on one hospital computer and saved locally on the hard drive secured by the hospital network under all the privacy laws of the MoH. This was shared with the team member undertaking transcribing, who has undergone Good Clinical Practice training and understands the importance of patient confidentiality and data protection. Ethical approval was sought from the MoH, as participants are based in MoH hospitals (approval number 1534/2020).

A semi-structured topic guide was developed in both Arabic and English. This has been informed by previous research (7, 22, 23, 35) and discussions with HCPs. Interviews took place between February and July 2021. The interviews were conducted in either Arabic or English, depending on the participants' preference. Interviews were transcribed verbatim by a member of the team. The data was managed

using the qualitative data management software MAXQDA 18 (36). Initial analysis was performed by DA, an experienced qualitative researcher, and discussed with the team. Interviews were transcribed in the source language to reduce the risk of translation incongruities that may impact data analysis (37).

There are diverse approaches to qualitative analysis, with thematic analysis underpinning them (38). Compared with other qualitative analysis methods, thematic analysis is seen as a flexible technique that can 'provide a rich and detailed, yet complex, account of data' (38). Analysis was conducted using principles of thematic framework analysis, and it was an iterative process. When using thematic framework analysis, it does not necessarily mean relying on the deductive approach, as there is flexibility to this analysis method, and both deductive and inductive approaches can be used to answer the research questions (39, 40). The framework approach consists of 3 stages; data management, descriptive accounts, and explanatory accounts, all in a continuous process (41).

Both inductive and deductive approaches were utilized, as well as constant comparison across transcripts; this was to ensure that theories are not limited to what is already known, and that analysis is not rigid (42). Constant comparison enabled an iterative approach whereby themes were searched and compared across participant data sets (43, 44).

Reflexivity in qualitative research is integral towards establishing rigor (45). The first author, AO, is a neuropsychiatrist who led the interviews with his team of psychiatrists; two interviewers are Kuwaiti and one is Egyptian; the Egyptian interviewer led the interviews with the non-Kuwaiti participants. As the healthcare profession is a tight-knit community, some of the participants were known to the interviewers; although this may pose some bias, it provided a conducive environment for the interview as participants felt at ease and discussed personal topics.

3. Results

3.1. Characteristics of participants

Twenty physicians were interviewed; characteristics of the sample are reported in Table 1. All work at large public hospitals, six in total. Quotes are followed by a code assigned to each participant, and each hospital is denoted with a code to safeguard anonymity of participants.

The themes that emerged from analysis of the data include: (1) enhance self-resilience, (2) a better-equipped workforce and healthcare environment, (3) and mitigate stigma and increase public awareness.

3.2. Enhance self-resilience

Participants discussed the trajectory of feelings, emotions, and experiences they had as the pandemic unfolded. A variety of psychosocial issues were experienced; depression and anxiety, trauma, stigma at work, isolation, burnout, feelings of guilt, and dealing with grief were all felt by the participants. Those with families had fears of contagion and spreading the virus to their loved ones; this led to many isolating themselves from their families, which had a toll on their mental health.

TABLE 1 Characteristics of participants.

	Number of participants
Gender	
Male	13
Female	7
Job title	
Medical Trainee	1
Medical Assistant	2
Assistant Registrar	3
Registrar	7
Senior Registrar	3
Consultant	3
Specialist	1
Age (years)	
25–30	6
31–35	4
36–41	10
Nationality	
Kuwaiti	10
Non-Kuwaiti	10
Contracted COVID-19 virus before interview	
Yes	8
No	12
Total number of participants	20

“Then I felt soo horrible, I mean I’m confined in a room, I have a bathroom, I have everything I want, my food comes to my doorstep but I can’t see my daughter! I can’t hug her! And I cannot see my family! I hear her coming across the corridor to go to our bedroom and sleep, and she asked ‘where’s daddy where’s daddy?’ ‘And daddy’s not there!’ That period was reaaally really difficult emotionally to cope with that isolation.” COV04, BC

Everyone suffered from some form of isolation, whether it was at work and being shunned by other colleagues not part of the COVID teams, or not being able to return home to be with their families as they feared for their safety. Some felt this isolation acutely as their families were back in Egypt. This negatively impacted the participants’ mental health, with some experiencing depression and anxiety as a result, and one participant attributing to it having a wider impact on his current behavior.

“Of course, thank God everything is different now...but I’m still affected...I mean I feel that in the last few months, something has changed in me which isn’t good...I’ve become prone to isolate myself from others...” COV20, B

There was also social stigma with participants reporting friends refusing to meet them due to their work with COVID and fearing getting infected; participants felt upset and this also led to isolation in some cases.

“At the beginning, the COVID team were like exiles, you know? We were isolated at work, almost no one talked to us or said hi, and if anyone saw us walking nearby, they would rush the other way, and this was whether we were wearing hazmat suits or not” COV09, B

Many of the participants expressed how they underwent an internal struggle with a dichotomy of emotions; they felt it was their responsibility to care for patients but on the other hand felt guilty of risking getting infected and passing it on to their loved ones, and some felt guilty for putting themselves before their patients when having to don PPE before helping them.

“it’s hard because you have a responsibility, you’re seeing patients and sacrificing for them but you have to think about your family at home and you might infect them or worse lose a loved a one!! You have to think this is not for me, but for my family...and you’re in this internal struggle with yourself...between your duty and your fear for your family and children and parents...it’s really hard! It’s a huge responsibility!” COV06, E

They also experienced low self-esteem and feelings of helplessness and guilt as no matter what they did, their patients deteriorated or died.

“Yeah! I definitely felt like an accomplice, like I was associated with that, like I was a part of that. That’s why one day I said I can’t be here anymore, I didn’t want to be a part of this, I feel like it’s affecting myself, and I felt more injured, every day I wake up and go “How can I call myself a doctor!?” you would say but you are saving lives! I’m not saving a single life! Every day where I sit, I come to work, I don’t see the patient get better because of me, they get better despite of me! That’s how I felt sometimes.” COV07, BC

Some participants had a family member pass away from COVID with them not being able to see them due to their working conditions; this played a role in their guilt. All experienced a sense of duty and ethical obligation to be part of the COVID team, warring with feelings of despair and fear. Some attributed this internal struggle to feeling guilty if they did not help lessen the burden on their colleagues. All these psychological issues were reflected in the participants’ personal lives and their families.

“But...it affects me when I hear that one of my colleagues passed away from COVID...this is when I realize how scary the situation is and it hits home...and from time to time I get black thoughts... what if something happened to me and my kids are so young... but then I quickly stop my train of thoughts and tell myself this is my job, yes this is my job...and we swore an oath! We swore an oath and we must respect that!” COV06, E

It was evident from the discussions that participants sometimes found it difficult to see that the daily psychological pressure was leading to a gradual deterioration in their mental health, with some experiencing depression and burnout without realizing. HCPs lack the skills and knowledge needed to identify what they are experiencing; by providing *psychological training* to

accomplish this, HCPs can seek psychological help in a timely manner.

“It requires skills to deal with burnout, and at the same time the physician should be able to identify that he’s experiencing burnout, and that it’s normal, and that the problem is not with you, the problem is how you’re managing the situation. This is really important!” COV03, A

Participants discussed how they lacked the *psychological support to deal with psychosocial issues*. Participants supported the use of psychological interventions, which were currently lacking. One-on-one and group therapy was suggested, as well as regular screening for depression and anxiety. Even the chance to talk about their experiences, such as the interviews conducted, was deemed beneficial.

“Yes, I think they would have benefited from psychiatric or psychological help. Because really everyone was stressed and everyone had fears and were upset because of all the changes that were happening, I mean other than the pressure at work, we all had our lives upended you know? I feel like every time I spoke with a colleague, or actually every time a colleague spoke with me I began to realize that we were all upset...everyone is going through negative emotions and I think it would have been a good idea if some help from the mental health team would have been provided.” COV05, D

To cope with the overwhelming stress of working in COVID teams, participants described some of the adaptive *coping mechanisms* they used. Some participants self-reflecting and meditated, while others relied on praying and resorted to religious coping to provide peace of mind and to feel “human.”

“We tried as much as we can to focus on spirituality...I mean I used to listen to some religious lectures, and these helped me...you feel like a deity and you start losing your humanity...increase oxygen, reduce oxygen...” COV19, B

Others described the activities they did, such as playing video games or binge-watching TV series, as things they used to do in their childhood that used to bring them joy.

“I began distracting myself with other things, things I stopped doing for a long time...like for example I started watching...before you’d have hobbies or things you liked doing, like listening to certain songs, music, watching series...as we got older, we forgot these interests and got caught up in work and had bigger responsibilities. Honestly, I started living my teenage years again!” COV01, A

Focusing on “human” tasks at home, such as laundry and cleaning, helped one participant as he felt he could clean his mess and control the outcomes; this reflects on how chaotic the experience with COVID was where HCPs felt powerless. Many avoided the media and tried to separate from their work life when they got home by “switching off” and sleeping. Some used the opportunity to focus on continuing their education as a distraction. When HCPs tested

positive and had to self-isolate, many found it difficult to cope and lacked the strategies to detach from their current experience. Others found self-isolation as an opportunity to discover past interests that helped them cope.

“Isolation had a positive effect on me in one respect, in that some interests that I gave up a long time ago because of family responsibilities and other things, such as reading literature far from the medical field, writing, things like this...I spend 3-4 hours and go back to reality, and it’s like a reset for the mind, takes you away for the medical field for a bit and brings you back.” COV10, B

Coping strategies adopted by the participants were all forms of individualized self-care, but they all achieved the same goal of supporting participants in adjusting to this new and ever-changing environment and to reduce the impact this had on their mental health and enhance their resilience.

Social support, whether it was from the participants’ families or the community, was not always available, and this further exacerbated their psychological wellbeing. Not all had supportive families, with some putting pressure on them to leave the COVID team. Others reflected on the lack of support from the public and their social circles. Some stated that even within their immediate environment and team, they would receive negative feedback and energy which was detrimental to their coping in the long run. Some participants had a support system in place, such as friends and colleagues that they could talk to or had access to a psychiatrist.

The healthcare force is made up of expatriates, the majority of whom left their families back home. Although some were grateful their families were not with them as they feared for their safety if they brought the infection home, being alone during this stressful time compounded their isolation and it was damaging their mental health, especially as they were unable to travel back home.

“Before COVID, I would go back home every 6 months or my family would come over...but the feeling that you were trapped and you’re helpless if anything happened to your family back home...and I’ve seen this happen with my colleagues, and that’s a horrific feeling, it’s indescribable!” COV02, A

One of the participants was pregnant during the first wave and many people criticized her. This intensified her guilt of putting herself and her unborn baby in danger, adding to her already growing stress and anxiety.

While the majority of people were working from home during the pandemic, HCPs were continuously working to keep everyone safe throughout the pandemic. One area that was lacking support was schooling; female participants with young children were working long shifts and having to manage online schooling, a completely new experience, alongside all the issues faced with the pandemic.

“We work till 1, and this is without our on-call and our normal work, and the online [schooling] is during our working hours, even when I requested afternoon schooling, they just started 11:30/12, so how can I make it back home?? I know I’m a doctor but I’m also a mother...and I would have to sacrifice something...it was hard...this is my children’s future, my son is in his

foundation years in first grade...this made the situation so much more difficult." COV06, E

Appreciation and support for HCP efforts, in the form of thank you tokens from patients and food donated by local businesses had a big impact on bolstering HCPs' wellbeing.

"There was a restaurant which made a pledge 'these people [HCPs] are working hard and need to eat well', and that felt amazing, it was a great gesture...that people would offer social support for the medical teams." COV12, C

The participants all described the psychological impact the COVID-19 pandemic had on their mental and physical wellbeing; enhancing HCPs' self-resilience to better manage the psychosocial factors should be deemed a priority to prepare them for crisis-management on an individual level and ultimately prevent burnout. This can be achieved through psychological training, readily available and accessible psychological support, targeted interventions to support coping, and social and family support.

3.3. A better equipped workforce and healthcare environment

On an organizational level, in terms of *working conditions, environment, and healthcare management*, many aspects came to light during the discussions that had an adverse impact and required improvement. With the pandemic, the working conditions within hospitals and the dynamics changed dramatically. HCPs were forced to work in a completely new context, outside of their specialty, and with a new team. Alongside the pressure of treating patients, they had to maneuver and adapt to this new setting and team dynamics, with many struggling to achieve team cohesion. This sometimes led to suboptimal patient care.

"It was a bit of a learning curve, because it was a new hospital, I didn't know anyone there, completely new team. The nurses; I didn't know nurses and it took me a while to figure out what nurses knew and what they were capable of...That was a problem. Because it came very clear that they were not the standards that I used to work in [previous hospital]. Here I expect things are done in a certain way and almost becomes automatic there and became very quickly, NO! I would have to do a lot of micromanaging which I don't like doing anyway! I have to audit everything that has been done and audit every order to make sure it's been carried true." COV07, BC

In addition, the long working hours and shortage of breaks and inability to take time off also impacted HCPs physically and mentally. Many reported a shortage of PPE at certain times during the pandemic, which meant they would sometimes sacrifice their own safety to treat patients. The decision-making process regarding treatment was affected greatly as there was a lack of standardized and unified treatment protocols, which also sometimes put HCPs in ethical dilemmas. Participants reported instability in daily policies and procedures regarding admission and discharge of patients, which added to the ever-growing confusion.

"Our problem was with the protocols and management, the management never gave us a chance to develop protocols, and every time we agreed on something, our boss which change everything...and this wasn't only in Kuwait, but worldwide, there was no consensus on disease management...there's no set protocol, every day there's a new recommendation, a new management strategy...this was there problem." COV02, A

Some hospitals implemented operation protocols that supported healthcare staff, which in turn reduced their risk of burnout and maintained appropriate staffing numbers.

"I didn't see people falling apart! That's the other fortunate thing! I haven't seen people that got so emotionally affected by what's going on! And I feel part of it, that we were fortunate that we had a controlled admission in general. Part of it, we limited the number of patients we have per physician. When you don't have to look at a unit of 30 patients, you are the only one who's rounding on them, it's different when you are rounding on 15 or maximum 20! And this is well-known even prior to COVID, that certain staffing number is what's acceptable and what works well! And I felt by maintaining this by us maintaining that, we assured that we won't have people burning out and falling apart." COV04, BC

Trauma was also perceived from the setting itself; HCPs had no area to rest and recharge, and in some cases the space provided was not conducive. Some participants suggested that hospitals allocate an area for exercising, for example, to unwind during work.

"There was this horrible and scary office, with dimmed lighting, really dim lighting in a room without any comfortable chairs, with no avenues to have fun at all, just sitting around waiting, just waiting...this greatly contributed to our depression...firstly the situation was difficult, the atmosphere was tense, there was no compensation and no relieving factors..." COV09, B

Some hospitals provided isolation rooms for staff that required them, such as those who did not want to risk infecting their families, and this was an excellent effort to ameliorate HCPs' stress.

Not all reported support from their management, which played a vital role in their daily work and worsened their stress. Some described how their hospital management encouraged autonomy and provided decision-making support, which alleviated the pressure on them.

"Luckily, things were, the group who gelled very well, stayed together in the hospital, the head of department didn't want to interfere in the daily work but was supportive whenever we needed things to be done, wasn't dictating how we managed the patient, he left us complete autonomy on how we managed the patients, we were able to increase the number of units over there, things just fell in their place appropriately." COV04, BC

Appreciation and understanding from hospital management had a profound effect on participants, which saw the impact ripple across staff.

"Honestly, Dr. S and the management group as a whole emotionally supported us, in a big way, 'we know you're tired,

we know there are problems but please bear with us, these words made a huge difference to us, 180-degree change from being negative to positive, someone who actually understands you! I began trying to be like them...I mean trying to support each other... 'guys we're doing good, we're making a difference, we have to continue fighting, we are making sure the infection doesn't spread to ourselves and our homes...we are doing something that others may not see!'" COV13, B

Not being able to take time off work, even for a few days, intensified HCPs' burnout; better work pattern management and rotating staff may have helped in providing some relief.

Regular and intensive training for healthcare teams to deal with crises is needed. Through the discussions with participants, it became apparent that not all teams were at the same standard, and those with experience had to manage and oversee the care.

"So, the first patient was the first one who was admitted to the ICU [intensive care unit] anywhere in Kuwait, got intubated, was difficult to ventilate and oxygenate and received ECMO [extracorporeal membrane oxygenation] within 12 hours of admission to ICU. So, to provide such advanced therapy in a unit that neither physicians nor nurses are familiar with a technology or with the complications if something goes wrong, that was a huuuuge huge struggle, and that was something that irked me so much." COV04, BC

Participants also described the process of informing the patients' family of their death which was very difficult and was met by backlash from the family; this increased HCPs' stress and they felt inadequate in dealing with it. Grief and communication counseling training is required to better equip HCPs.

"I'm a surgeon by trait, so I don't really have a good socio-cultural background! I just don't! We were trying to do certain things like the regular breaking bad news stuff, sort of scale it up a little bit in trauma and that we spend enough time learning more about mental health for us and for the patients. But in general, nothing compared me for dealing with families here..." COV14, C

It was felt by participants that there was a *lack of psychological support for patients*. Participants stated they were mentally and physically exhausted. Not only did they have to deal with their own mental wellbeing, but they also had to offer psychological support to their patients to compensate for the lack in mental healthcare. This took its toll on HCPs who had to spend time and energy to make their patients feel safe and reduce their fears. One participant experienced this when he had COVID:

"Every few minutes I would measure my heart rate, check my saturation. How would you think a patient with no medical background would feel when they constantly hear people are dying? So all of them, well not all of them but maybe 95% would get depressed, have extreme fear, phobia, I think a lot of people... even God rest him in peace Dr. A, they say one of the things that made his health deteriorate was his fear of death, psychologically

he was really affected even though he wasn't displaying severe COVID symptoms..." COV11, B

On an organizational level, supportive and understanding management, resource availability, standardized working conditions and staff rotation were advocated. Regular and intensive training taking into account the experiences of the COVID teams was also deemed imperative for a better equipped healthcare force. There also needs to be psychological support for patients to mitigate the burden on HCPs on the frontline, as well as grief counselors for families if needed.

3.4. Mitigate stigma and increase public awareness

On a national level, public awareness of the pandemic and HCP efforts was not at the forefront. The media played a major part in this. The media was also aggravating the situation, with tensions rising and animosity from the public towards the MoH and the HCPs by association.

"Stigma, mmmmm... Nothing direct, but as in general there's... I don't know from what I read from social media and stuff, I feel there's a lot of hate towards doctors lately..." COV16, F

Videos and messages circulated on social media had a direct impact on patient care and affected HCPs' efforts.

"I was feeling angry during that period, as it was the same time that a video circulated of an actor dying, and people kept saying it was because of corticosteroids...so we had so many patients, extremely sick with bad saturation levels and they would refuse steroids, refuse to be admitted, refuse to go to the ICU, even though they need it...so it was really frustrating!" COV15, F

Participants discussed their frustration when encountering family members or patients that do not believe in the virus nor vaccination.

"I felt that many people did not understand the situation that we were in...I mean I know...thankfully the majority of Kuwaiti society are educated...it's very rare in this day and age that you find someone, whether Kuwaiti or non-Kuwaiti who is not educated. Everyone reads...everyone has a smart phone and have easy access for any information, you know? But I started getting upset...with time...I mean especially with the curfews, I felt people started blaming HCPs...it's your fault...vaccination problems, people are refusing vaccination...people were resisting and saying 'there was no need for curfews! Corona virus is a lie! The vaccine is a conspiracy!'" COV20, B

A more positive approach should be taken to better disseminate information to enhance public awareness. In order to achieve this and gain patients' and the public's trust, efforts should be taken to attain their perspectives. The media should also be involved to tackle this issue from all sides across all platforms to mitigate stigma towards HCPs.

4. Discussion

It is evident from the results that COVID-19 has had a significant psychological impact on COVID teams, and it is imperative that we address this. HCPs were working in a new and stressful environment, and this added to their experienced trauma. The overwhelming pressure to keep up with the high rise in cases in sometimes inadequate conditions added to their stress. Many reported internal struggles; responsibility and ethical duty against guilt and fear for safety. HCPs are vital resources for every country. Their health and safety are crucial not only for continuous and safe patient care, but also to mitigate the effects of any outbreak. The findings shed light on the factors contributing to the psychological effect of the COVID-19 pandemic on an individual, organizational, and national level and provided suggestions to support medical staff to deal with current ongoing demands as well as prepare them for future crises. This is adapted from the social-ecological framework (46) to help examine the impact of COVID-19 across different levels, from individuals to systems.

Qualitative studies conducted around the world support the current findings, with psychosocial issues such as isolation and social stigma, depression, stress and burnout at the forefront (35, 47–50). The new and changing working environment and its impact on HCPs during this pandemic was also reported. Communication challenges within teams and across healthcare and policy makers was deemed as a stressor and better support structures should be put in place (51). The stigma perceived from family and the public also posed negative implications (52), which was seen in Kuwait as well. Many described their experiences as learning curves, whether dealing with the unknown manifestation of COVID or navigating the dynamic working conditions and teams. This was echoed by HCPs in Oman who described their learning as a continuous process (53).

Based on our interactions with the participants, HCPs felt like they were going to war and there was a war-like mentality, and as soldiers they felt they were not properly trained or built to deal with this pandemic, and thus their coping strategies were not always adequate. Our current healthcare systems focus on chronic diseases and their treatment rather than on infectious diseases at this mass level. It was evident from the findings that although some coping strategies were similar, they were all based on each individual's background and stage of deterioration of their mental health, as individuals respond to stress differently (54). Coping strategies have protective effects against the burden of the pandemic, and these are recommended to be emotion-based, such as religious coping, with an active approach, such as seeking social support (55). Interventions and suggestions for coping strategies should be tailored to take this into account to increase their uptake and be successful (51, 56). When it comes to support needs, it was apparent that better psychosocial support was necessary. Dissemination of standardized information and protocols was also lacking, which contributed to the issues encountered by the participants. This was also reported in other countries and highlights the change of pace and possible lack of transparency (52, 57, 58).

Resilience is an important concept in this context as it refines the relationship between perceived risk and potential mental health issues (59). Enhancing health organizations' efforts, such as through better communication, mitigating HCPs' stress, and focusing on improving work patterns and conditions all assist in building resilience (57, 58).

HCPs showed a tremendous sense of responsibility and concerted efforts in alleviating patients' suffering, including working in a totally new context, physical exhaustion due to heavy workloads and PPE, the fear of becoming infected and infecting others, and feeling powerless to handle patients' conditions. To cope with stressful situations, they identified many sources of social support, defined here as support from family members and friends, and used self-management strategies. They also described how they were able to transcend the difficulties inherent in their unique experience.

By understanding the impact of COVID-19 on the mental health of those taking care of patients with COVID-19, this would assist in developing targeted interventions that improve their psychological wellbeing. This would help in supporting HCPs to reduce burnout, continue effective care of patients, and enhance resilience. The landscape following COVID-19 is ever-changing and there is a need to build resilience and implement supportive interventions to help healthcare systems manage the next pandemic.

4.1. Recommendations

Some HCPs may not prefer professional help and would rather talk with a colleague informally, whereas others would place more emphasis on PPE availability to ease their fears and anxiety, and thus HCP input is imperative when developing recommendations (60). Some recommendations that have emerged from the findings focus on three areas to better support medical staff with the ongoing demands of working in the current environment, as well as prepare healthcare in Kuwait for future crises.

On the individual level, there is a wide array of mental health support avenues available for implementation. Ensuring HCPs are well supported and alleviating their psychological distress can in turn positively impact patient safety as well as improve staff retention rates (61), and thus efforts should be made to offer targeted support. Based on the findings and participant experiences, the availability of support groups, having a resident psychiatrist for one-to-one sessions, and mindfulness sessions can all meet their needs. An online mindfulness intervention used by HCPs in Kuwait during the pandemic demonstrated improved mental health outcomes (30). Peer support and mindfulness interventions were also suggested by HCPs in Spain during the pandemic (50). Cognitive-based therapy, whether as individuals or groups, has also been shown to reduce symptoms of anxiety and depression in HCPs who have faced crises (62). Part of the psychological support should also include education and training on recognizing symptoms of depression, anxiety, and burnout, as it was evident HCPs had difficulty identifying this. There should also be an outlet for HCPs to voice their needs and be provided support and time off. Managers can enhance resilience by providing tailored coping approaches for their respective team members and fostering trust and communication. In addition, HCPs on the frontlines are the most important stakeholders as they are seeing the shortfalls of the system and can provide significant insight and help from within; as such, healthcare systems should seek HCPs' input through the provision of a channel for suggestions. Social support should also be taken into consideration to guarantee all aspects are met, as resilience and social support are essential protective factors against burnout (17).

Looking at the organizational level, there needs to be better resource availability in terms of PPE to alleviate HCPs fears and

ensure they feel that the healthcare system cares about their safety. It was evident that staff required regular and intensive training to be able to work in any situation and environment, especially in a crisis, and that this training needs to be standardized so no time or efforts are wasted. This pandemic should be a learning experience where better protocols and triage procedures are developed to deal with any similar outbreaks. Future training development should involve COVID teams whose comprehensive experience can ensure all relevant points are included and to better prepare future HCPs. Hospitals should also endeavor to develop and implement mentorship programs to promote workplace support and solidarity. To make sure HCPs can take time off and working patterns are improved, staff allocation should be optimized, with more staff placed in intensive care units. Better management of overworked staff and implementing sufficient breaks were also advocated in previous work (63). Acknowledgement of COVID teams and their efforts by their management was also deemed important and had a positive impact on them, as seen in China as well (64). There should also be a grief counselor for patients and their families to alleviate the pressure on HCPs. HCPs also play a role in reducing psychological stress in patients and their role needs to be brought to the forefront (65). In addition, offering psychological support for patients reduces the pressure on frontline HCPs (66). Training on communicating news of death to families from diverse cultures should also be provided as HCPs come from different backgrounds and may have difficulties in relaying this information in the appropriate way.

On a national level, governments should strive towards better partnerships with the local media outlets. Governments and health authorities can mitigate stigma and assure that correct and evidence-based health messages are shared in a timely manner (66). Patient and public engagement is also imperative to reduce stigma and ensure public awareness messages are disseminated in the best approach.

4.2. Strengths and limitations

To our knowledge, this is the first qualitative study undertaken in Kuwait studying the psychological impact of COVID-19 on healthcare professionals. The sample size may be considered small, but recruitment continued until data saturation was reached (32). Although some of the participants may have been known to the interviewers superficially, this assisted in creating a safe environment where thoughts and feelings were shared due to trust and rapport. Furthermore, the interviewers assured the participants of anonymity and confidentiality. We endeavored to include a representative sample of the frontline workforce in Kuwait by including Kuwaiti and non-Kuwaiti doctors; it would be beneficial to include other HCPs in future research. To ensure participants' privacy and confidentiality during this sensitive and stressful time, we decided not to utilize video recordings for facial expression analysis.

5. Conclusion

The COVID-19 pandemic has put the healthcare force on the frontlines under psychological pressure and findings from the current study have identified these stressors and how to target them on an individual, organizational, and national level. The results have assisted

in highlighting areas of improvement to better prepare the healthcare workforce for future pandemics and provided insight to recommend targeted interventions that will improve the psychological wellbeing and help in supporting HCPs to reduce burnout, continue effective care of patients, and enhance resilience. The implications of the findings are wide-ranging on practice and policy, and future work should focus on developing and testing the effectiveness of interventions and support mechanisms. This will assist in mitigating the ongoing psychological impact of the pandemic, as well as prepare them for future crises.

Data availability statement

The original datasets presented in this article are not readily available because they contain potentially identifying or sensitive personal information. Requests to access the de-identified datasets can be sent to the corresponding author at dalal.alsaeed@dasmaninstitute.org.

Ethics statement

The studies involving human participants were reviewed and approved by the Kuwait Ministry of Health Ethics Review Board (approval number 1534/2020). The patients/participants provided their written informed consent to participate in this study.

Author contributions

EO led the study conceptualization. DA led the study design, methodology, funding acquisition, and drafted the manuscript. AA-O led the data collection. All authors contributed to revising the manuscript, approved the submitted version, and involved in data analysis.

Funding

This study was funded by the Kuwait Foundation for the Advancement of Science (Grant number CORONA PROP 88—PN20-13NO-01).

Acknowledgments

We would like to thank the Kuwait Foundation for the Advancement of Science for their support and grant (CORONA PROP 88—PN20-13NO-01). We would also like to thank all the participants for their time and efforts during this pandemic. Special thanks to Ms. Lamees ALAdwan for her transcribing services.

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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References

- Xu Z, Shi L, Wang Y, Zhang J, Huang L, Zhang C, et al. Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *Lancet Respir Med.* (2020) 8:420–2. doi: 10.1016/S2213-2600(20)30076-X
- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet.* (2020) 395:497–506. doi: 10.1016/S0140-6736(20)30183-5
- WHO (n.d.). WHO coronavirus (COVID-19) dashboard [internet]. Available at: <https://covid19.who.int> (Accessed February 15, 2023).
- Yang H, Bin P, He AJ. Opinions from the epicenter: an online survey of university students in Wuhan amidst the COVID-19 outbreak¹¹. *J Chin Gov.* (2020) 5:234–48. doi: 10.1080/23812346.2020.1745411
- Iii LGC, Woodard SR, Zubrod A. (2020). Social psychological measurements of COVID-19: Coronavirus perceived threat, government response, impacts, and experiences questionnaires. Available from: <https://psyarxiv.com/z2x9a/> [Preprint].
- Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet.* (2020) 395:912–20. doi: 10.1016/S0140-6736(20)30460-8
- Roy D, Tripathy S, Kar SK, Sharma N, Verma SK, Kaushal V. Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J Psychiatry.* (2020) 1:102083. doi: 10.1016/j.ajp.2020.102083
- Krishnamoorthy Y, Nagarajan R, Saya GK, Menon V. Prevalence of psychological morbidities among general population, healthcare workers and COVID-19 patients amidst the COVID-19 pandemic: a systematic review and meta-analysis. *Psychiatry Res.* (2020) 1:113382. doi: 10.1016/j.psychres.2020.113382
- Bueno-Notivol J, Gracia-García P, Olaya B, Lasheras I, López-Antón R, Santabárbara J. Prevalence of depression during the COVID-19 outbreak: a meta-analysis of community-based studies. *Int J Clin Health Psychol.* (2021) 21:100196. doi: 10.1016/j.ijchp.2020.07.007
- Petrie K, Crawford J, Baker STE, Dean K, Robinson J, Veness BG, et al. Interventions to reduce symptoms of common mental disorders and suicidal ideation in physicians: a systematic review and meta-analysis. *Lancet Psychiatry.* (2019) 6:225–34. doi: 10.1016/S2215-0366(18)30509-1
- Chigwedere OC, Sadath A, Kabir Z, Arensman E. The impact of epidemics and pandemics on the mental health of healthcare workers: a systematic review. *Int J Environ Res Public Health.* (2021) 18:6695. doi: 10.3390/ijerph18136695
- Magnavita N, Chirico F, Garbarino S, Bragazzi NL, Santacroce E, Zaffina S. SARS/MERS/SARS-CoV-2 outbreaks and burnout syndrome among healthcare workers. An umbrella systematic review. *Int J Environ Res Public Health.* (2021) 18:4361. doi: 10.3390/ijerph18084361
- Preti E, di Mattei V, Perego G, Ferrari F, Mazzetti M, Taranto P, et al. The psychological impact of epidemic and pandemic outbreaks on healthcare workers: rapid review of the evidence. *Curr Psychiatry Rep.* (2020) 22:43. doi: 10.1007/s11920-020-01166-z
- Brier ND, Stroobants S, Vandekerckhove P, Buck ED. Factors affecting mental health of health care workers during coronavirus disease outbreaks (SARS, MERS & COVID-19): a rapid systematic review. *PLoS One.* (2020) 15:e0244052. doi: 10.1371/journal.pone.0244052
- Tawfik DS, Scheid A, Profit J, Shanafelt T, Trockel M, Adair KC, et al. Evidence relating health care provider burnout and quality of care. *Ann Intern Med.* (2019) 171:555–67. doi: 10.7326/M19-1152
- Freudenberger HJ. Staff Burn-Out. *J Soc Issues.* (1974) 30:159–65. doi: 10.1111/j.1540-4560.1974.tb00706.x
- Lluch C, Galiana L, Doménech P, Sansó N. The impact of the COVID-19 pandemic on burnout, compassion fatigue, and compassion satisfaction in healthcare personnel: a systematic review of the literature published during the first year of the pandemic. *Healthcare.* (2022) 10:364. doi: 10.3390/healthcare10020364
- Aymerich C, Pedruzo B, Pérez JL, Laborda M, Herrero J, Blanco J, et al. COVID-19 pandemic effects on health worker's mental health: systematic review and meta-analysis. *Eur Psychiatry.* (2022) 65:e10. doi: 10.1192/j.eurpsy.2022.1
- de Kock JH, Latham HA, Leslie SJ, Grindle M, Munoz SA, Ellis L, et al. A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. *BMC Public Health.* (2021) 21:104. doi: 10.1186/s12889-020-10070-3
- Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ.* (2020) 26:368. doi: 10.1136/bmj.m1211
- Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care.* (2020) 9:241–7. doi: 10.1177/2048872620922795
- Mo Y, Deng L, Zhang L, Lang Q, Liao C, Wang N, et al. Work stress among Chinese nurses to support Wuhan for fighting against the COVID-19 epidemic. *J Nurs Manag.* (2020) 28:1002–9. doi: 10.1111/jonm.13014
- Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open.* (2020) 3:e203976–6. doi: 10.1001/jamanetworkopen.2020.3976
- Luo M, Guo L, Yu M, Jiang W, Wang H. The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public – a systematic review and meta-analysis. *Psychiatry Res.* (2020) 291:113190. doi: 10.1016/j.psychres.2020.113190
- Dragioti E, Tsatsalis D, Mentis M, Mantzoukas S, Gouva M. Impact of the COVID-19 pandemic on the mental health of hospital staff: an umbrella review of 44 meta-analyses. *Int J Nurs Stud.* (2022) 1:104272. doi: 10.1016/j.ijnurstu.2022.104272
- Pappa S, Stella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun [Internet].* (2020) 88:901–7. doi: 10.1016/j.bbi.2020.05.026
- Abdulghafour YA, Bo-hamra AM, Al-Randi MS, Kamel MI, El-Shazly MK. Burnout syndrome among physicians working in primary health care centers in Kuwait. *Alex J Med.* (2011) 47:351–7. doi: 10.4314/bafm.v47i4
- Felton JS. Burnout as a clinical entity—its importance in health care workers. *Occup Med.* (1998) 48:237–50. doi: 10.1093/occmed/48.4.237
- Alsairafi Z, Naser AY, Alsaleh FM, Awad A, Jalal Z. Mental health status of healthcare professionals and students of health sciences faculties in Kuwait during the COVID-19 pandemic. *Int J Environ Res Public Health.* (2021) 18:2203. doi: 10.3390/ijerph18042203
- Al Ozairi A, Alsaeed D, Al-Ozairi E, Irshad M, Crane RS, Almoula A. Effectiveness of virtual mindfulness-based interventions on perceived anxiety and depression of physicians during the COVID-19 pandemic: a pre-post experimental study. *Front Psych.* (2023) 13:1089147. doi: 10.3389/fpsy.2022.1089147
- Barry M, Al Amri M, Memish ZA. COVID-19 in the shadows of MERS-CoV in the Kingdom of Saudi Arabia. *J Epidemiol Glob Health.* (2020) 10:1–3. doi: 10.2991/jegh.k.200218.003
- Fusch P, Ness L. Are we there yet? Data saturation in qualitative research. *Qual Rep.* (2015) 20:1408–16. doi: 10.46743/2160-3715/2015.2281
- Archibald MM, Ambagtsheer RC, Casey MG, Lawless M. Using zoom videoconferencing for qualitative data collection: perceptions and experiences of researchers and participants. *Int J Qual Methods.* (2019) 1:1609406919874596. doi: 10.1177/1609406919874596
- Weller S. Using internet video calls in qualitative (longitudinal) interviews: some implications for rapport. *Int J Soc Res Methodol.* (2017) 20:613–25. doi: 10.1080/13645579.2016.1269505
- Sun N, Wei L, Shi S, Jiao D, Song R, Ma L, et al. A qualitative study on the psychological experience of caregivers of COVID-19 patients. *Am J Infect Control.* (2020) 48:592–8. doi: 10.1016/j.ajic.2020.03.018
- Verbi Software (2017). MAXQDA 2018 [Internet]. Berlin, Germany. Available from: <https://www.maxqda.com>
- Al-Amer R, Ramjan L, Glew P, Darwish M, Salamonson Y. Language translation challenges with Arabic speakers participating in qualitative research studies. *Int J Nurs Stud.* (2016) 54:150–7. doi: 10.1016/j.ijnurstu.2015.04.010
- Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* (2006) 3:77–101. doi: 10.1191/1478088706qp0630a
- Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol.* (2013) 18:117. doi: 10.1186/1471-2288-13-117
- Vaismoradi M, Turunen H, Bondas T. Content analysis and thematic analysis: implications for conducting a qualitative descriptive study. *Nurs Health Sci.* (2013) 15:398–405. doi: 10.1111/nhs.12048
- Smith J, Firth J. Qualitative data analysis: the framework approach. *Nurse Res.* (2011) 18:52–62. doi: 10.7748/nr2011.01.18.2.52.c8284
- Bowling A. *Research methods in health: Investigating health and health services.* 4th ed. Berkshire, United Kingdom: Open University Press (2014). 536 p.

43. Glaser BG. The constant comparative method of qualitative analysis. *Soc Probl.* (1965) 12:436–45. doi: 10.2307/798843
44. Pope C, Mays N. Reaching the parts other methods cannot reach: an introduction to qualitative methods in health and health services research. *BMJ.* (1995) 311:42–5. doi: 10.1136/bmj.311.6996.42
45. Berger R. Now I see it, now I don't: researcher's position and reflexivity in qualitative research. *Qual Res.* (2015) 15:219–34. doi: 10.1177/1468794112468475
46. Bronfenbrenner U. Toward an experimental ecology of human development. *Am Psychol.* (1977) 32:513–31. doi: 10.1037/0003-066X.32.7.513
47. Liu Q, Luo D, Haase JE, Guo Q, Wang XQ, Liu S, et al. The experiences of health-care providers during the COVID-19 crisis in China: a qualitative study. *Lancet Glob Health.* (2020) 8:e790–8. doi: 10.1016/S2214-109X(20)30204-7
48. Munawar K, Choudhry FR. Exploring stress coping strategies of frontline emergency health workers dealing Covid-19 in Pakistan: a qualitative inquiry. *Am J Infect Control.* (2021) 49:286–92. doi: 10.1016/j.ajic.2020.06.214
49. Kackin O, Ciydem E, Aci OS, Kutlu FY. Experiences and psychosocial problems of nurses caring for patients diagnosed with COVID-19 in Turkey: a qualitative study. *Int J Soc Psychiatry.* (2020) 16:0020764020942788. doi: 10.1177/0020764020942788
50. Mediavilla R, Monistrol-Mula A, McGreevy KR, Felez-Nobrega M, Delaire A, Nicaise P, et al. Mental health problems and needs of frontline healthcare workers during the COVID-19 pandemic in Spain: a qualitative analysis. *Front Public Health [Internet].* (2022) 10:956403. doi: 10.3389/fpubh.2022.956403
51. Aughterson H, McKinlay AR, Fancourt D, Burton A. Psychosocial impact on frontline health and social care professionals in the UK during the COVID-19 pandemic: a qualitative interview study. *BMJ Open.* (2021) 11:e047353. doi: 10.1136/bmjopen-2020-047353
52. Cabarkapa S, Nadjidai SE, Murgier J, Ng CH. The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and ways to address it: a rapid systematic review. *Brain Behav Immun Health.* (2020) 8:100144. doi: 10.1016/j.bbih.2020.100144
53. Al Ghafri T, Al Ajmi F, Anwar H, Al Balushi L, Al Balushi Z, Al Fahdi F, et al. The experiences and perceptions of health-care workers during the COVID-19 pandemic in Muscat, Oman: a qualitative study. *J Prim Care Community Health.* (2020) 11:215013272096751. doi: 10.1177/2150132720967514
54. Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. *J Pers Soc Psychol.* 56:19890601:267.
55. Hannemann J, Abdalrahman A, Erim Y, Morawa E, Jerg-Bretzke L, Beschoner P, et al. The impact of the COVID-19 pandemic on the mental health of medical staff considering the interplay of pandemic burden and psychosocial resources—a rapid systematic review. *PLoS One.* (2022) 17:e0264290. doi: 10.1371/journal.pone.0264290
56. Eftekhari Ardebili M, Naserbakht M, Bernstein C, Alazmani-Noodeh F, Hakimi H, Ranjbar H. Healthcare providers experience of working during the COVID-19 pandemic: a qualitative study. *Am J Infect Control.* (2021) 49:547–54. doi: 10.1016/j.ajic.2020.10.001
57. Norful AA, Rosenfeld A, Schroeder K, Travers JL, Aliyu S. Primary drivers and psychological manifestations of stress in frontline healthcare workforce during the initial COVID-19 outbreak in the United States. *Gen Hosp Psychiatry.* (2021) 1:20–6. doi: 10.1016/j.genhosppsych.2021.01.001
58. Rieckert A, Schuit E, Bleijenberg N, ten Cate D, de Lange W, de Man-van Ginkel JM, et al. How can we build and maintain the resilience of our health care professionals during COVID-19? Recommendations based on a scoping review. *BMJ Open.* (2021) 11:e043718. doi: 10.1136/bmjopen-2020-043718
59. Yildirim M, Arslan G, Öztaş A. Perceived risk and mental health problems among healthcare professionals during COVID-19 pandemic: exploring the mediating effects of resilience and coronavirus fear. *Int J Ment Health Addict.* (2020) 20:1035–45. doi: 10.1007/s11469-020-00424-8
60. Muller AE, Hafstad EV, Himmels JPW, Smedslund G, Flottorp S, Stensland SO, et al. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: a rapid systematic review. *Psychiatry Res.* (2020) 1:113441. doi: 10.1016/j.psychres.2020.113441
61. Rangachari P, Woods JL. Preserving organizational resilience, patient safety, and staff retention during COVID-19 requires a holistic consideration of the psychological safety of healthcare workers. *Int J Environ Res Public Health.* (2020) 17:E4267. doi: 10.3390/ijerph17124267
62. Ottisova L, Gillard JA, Wood M, Langford S, John-Baptiste Bastien R, Madinah Haris A, et al. Effectiveness of psychosocial interventions in mitigating adverse mental health outcomes among disaster-exposed health care workers: a systematic review. *J Trauma Stress.* (2022) 35:746–58. doi: 10.1002/jts.22780
63. Newman KL, Jeve Y, Majumder P. Experiences and emotional strain of NHS frontline workers during the peak of the COVID-19 pandemic. *Int J Soc Psychiatry.* (2022) 68:783–90. doi: 10.1177/00207640211006153
64. Cai H, Tu B, Ma J, Chen L, Fu L, Jiang Y, et al. Psychological impacts and coping strategies of front-line medical staff during COVID-19 outbreak in Hunan, China. *Med Sci Monit.* (2020) 26:26. doi: 10.12659/MSM.924171
65. Chou CL. How COVID-19 disrupts—and enhances—my clinical work. *J Patient Exp.* (2020) 8:2374373520918739. doi: 10.1177/2374373520918739
66. Ho CS, Chee CY, Ho RC. Mental health strategies to combat the psychological impact of CoronavirusDisease 2019 (COVID-19) beyond paranoia and panic. *Ann Acad Med Singap.* (2020) 49:155–60. doi: 10.47102/annals-acadmedsg.202043

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