



Research article

Psychological resilience and related factors among primary care workers in Wuhan, China: A cross-sectional study

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ABSTRACT

Purpose: Primary medical workers constitute a high-risk group for mental health problems, and psychological resilience might protect them from the negative psychological impacts of their work. Therefore, this study aimed to investigate the current situation of psychological resilience among primary care workers in Wuhan, China, as well as related factors.

Methods: In this cross-sectional study, a total of 417 primary care workers (30.0 % men; 38.5 ± 8.5 years old) were randomly selected to complete a questionnaire. The brief version of the National Mental Health Literacy Questionnaire and the Psychological Resilience Scale were used to assess participants' mental health literacy and psychological resilience, respectively. Multiple linear regression was performed to identify factors associated with the psychological resilience of primary care workers.

Results: More than four-fifths of the primary care workers included in this study exhibited appropriate levels of mental health knowledge. In terms of mental health skills, participants' attainment rates, ranging from high to low, were 60.9 % for distracting attention, 45.3 % for interpersonal support and 43.9 % for cognitive reappraisal. The average psychological resilience score obtained by primary care workers was 27.81 ± 5.71, and the factors associated with increased psychological resilience included being male, being older, and possessing higher mental health skills, including skills pertaining to interpersonal support and distracting attention.

Conclusion: The psychological resilience of primary care workers in Wuhan is at a moderate level and thus requires further improvement. Although these medical staff exhibit appropriate levels of mental health knowledge, their mental health skills are relatively poor, despite the fact that interpersonal support and distracting attention are significantly associated with psychological resilience. Hence, interventions targeting mental health skills are recommended to promote psychological resilience among primary care workers.

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1. Introduction

In China, primary care workers are important providers of basic medical care and public health services, including chronic disease prevention and control as well as health management; accordingly, they serve as the “gatekeepers of health” [1–3]. These staff members generally work in local primary medical institutions, including community health service centers, township health centers, village clinics and outpatient departments. According to the China Health Statistics Yearbook 2022, in 2021, the total number of health workers in China was 14.0 million, of whom 4.4 million were primary care workers (only 31.7 %) [4]. Due to China’s large population, the country features a tremendous demand for health resources, especially primary health human resources.

However, the primary medical and health system faces many challenges, such as poor working environments, insufficient salaries, and inefficient incentive systems [5]. In addition, heavy workloads and high occupational pressure have led to decreased job satisfaction, increased work burnout and even the emergence of presenteeism, which refers to situations in which workers appear to be on the job but are not actually working [6]. Especially during the COVID-19 pandemic, primary care workers came into close contact with suspected or confirmed patients; due to the resulting risk of infection as well as overwork, these workers thus faced physical and psychological pressure [7]. Such pressure affected the mental health of medical staff in both the short and long term. Researchers have reported that during the COVID-19 epidemic, the self-reported rates of anxiety, depression and both of these disorders among medical staff were 13.3 %, 18.4 % and 23.9 %, respectively [8]. During the process of normalizing COVID-19 prevention and control, the prevalence of such mental health problems still reached 20.25 % [9]. Under these conditions, primary care workers must rely on psychosocial resources that can potentially mitigate the negative effects of stressors on their mental health.

Occasionally, individuals may experience depression and other mental health problems due to acute or chronic stress. However, some of these individuals may achieve higher levels of self-adjustment and psychological performance than expected through learning and training, an outcome which has been explained by reference to psychological resilience [10]. Psychological resilience is defined as the ability to overcome difficulties pertaining to perseverance and to maintain good self-awareness and internal coherence by activating personal growth [11]. Psychological resilience is essential for individuals’ ability to overcome stress and cope with adversity [12]. In response to negative stimuli, individuals who exhibit good psychological resilience can adjust their emotions and minimize maladaptive psychological and physical emotional reactions and changes, thus reducing the negative impact of adversity on individuals [13]. Some studies have even identified depression, anxiety and post traumatic stress disorder symptoms as the result of the failure to utilize resilience to promote self-adjustment [14]. Several studies have shown that psychological resilience might protect individuals from severe stress and that this factor is negatively correlated with burnout and depressive symptoms among hospital personnel [7,15,16], thus suggesting that cultivating psychological resilience among primary care workers might be a promising way to protect medical staff from the negative psychological impacts of medical work and promote their mental health.

Mental health literacy has been defined in terms of the knowledge and skills that are required to foster mental health, including those pertaining to the early recognition, management and prevention of mental health issues [17]. Mental health knowledge, information concerning help-seeking, and coping skills are vital components of mental health literacy [18]. Previous studies have suggested that increased mental health literacy entails the possibilities of improving resilience and mastering more coping skills [19, 20]. For example, individuals who exhibit higher levels of mental health literacy tend to employ positive coping strategies when they experience psychological stress [21,22]. A recent cross-sectional study also demonstrated that mental health literacy is positively correlated with resilience [23].

Only limited studies have investigated mental health literacy and psychological resilience among primary care workers in China, and the few studies that have investigated this topic have focused mainly on adolescents [24–26]. In light of the high risk of mental health problems faced by primary care workers, their ability to cope with such psychological suffering seems to be essential. In recent years, mental health services have greatly expanded in China; such services address not only severe mental illnesses but also depression, anxiety, insomnia and other psychological problems [27]. Furthermore, primary care workers, as the main providers of mental health services, have received extensive psychological training [28]. We assume that primary care workers may exhibit relatively high levels of mental health literacy and psychological resilience. Therefore, this study aimed to investigate the current situation of psychological resilience among primary care workers in Wuhan, China, as well as the association between psychological resilience and mental health literacy; the goal of this study is to provide guidance regarding the development of psychological intervention strategies for Chinese primary care workers.

2. Materials and methods

2.1. Study design and participants

In December 2021, an online survey was conducted to investigate psychological resilience and mental health literacy among primary care workers. We used the following formula to calculate the sample size:

$$N = \frac{Z_{\alpha/2}^2 \rho(1 - \rho)}{\sigma^2}$$

Given a 75.9 % attainment rate of mental health knowledge and a 44.8 % attainment rate of mental health skills among Chinese residents [29], when $\alpha = 0.05$, σ (tolerance error) was set to 5 % and the expected response rate was set to 90 %, the largest estimated sample size was 422. The online survey employed a systematic sampling approach. First, the list of primary care workers was obtained from the registered grassroots health system, and a total of 6411 staff members who were 18 years old or older and who had been

engaged in community health services for at least one year were recruited. The sampling interval was set as 15, the first participant was obtained by employing a simple random sampling method, and subsequent participants were obtained every 15 intervals. Ultimately, 422 questionnaires were distributed online, and 417 questionnaires were returned; the response rate was thus 98.8 %.

The survey protocol was approved by the Ethics Committee of the Wuhan Mental Health Center (approval number: KY2020.1221.01). All participants provided electronic informed consent, and the security of their information and the fact that it would be accessible only to the researchers were guaranteed.

2.2. Measures and procedures

The survey questionnaire was administered online and completed anonymously. Demographic variables such as sex, age, educational attainment, department and annual household income per capita were included in the questionnaire.

The brief version of the National Mental Health Literacy Questionnaire (NMHLQ), which was developed by the Institute of Psychology, Chinese Academy of Sciences, was used to evaluate mental health literacy. Mental health-related knowledge was evaluated using 20 judgment questions; in particular, 1 point was awarded for each correct answer, while 0 points were awarded for incorrect answers or answers of “unknown”. The total mental health knowledge score ranged from 0 to 20, and a cutoff score of 16 was set as the standard; that is, a total score lower than 16 was identified as indicating poor mental health literacy. This scale has been shown to exhibit good reliability and validity [29,30]. Mental health skills were evaluated using 11 self-assessment questions, which focused mainly on self-behaviors in life; this measure included 5 questions pertaining to distracting attention, 3 questions related to interpersonal support and 3 questions concerning cognitive reappraisal. Each item was scored on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Notably, two items (Items 3 and 7) were reverse-coded during the generation of the measure. The total scores for distracting attention, interpersonal support and cognitive reappraisal ranged from 5 to 20, 3–12 and 3–12, respectively, in which context higher scores indicated stronger mental health skills. In this study, the Cronbach’s α coefficient of the mental health skill scale was 0.802, thus indicating good reliability. A mean item score of 3.0 was set as the criterion for mental health skills, which corresponded to an average answer of “agree” for all items and was viewed as indicating complete possession of mental health skills.

Psychological resilience was assessed using the 10-item Connor-Davidson Resilience Scale (CD-RISC-10). This scale has been widely used to measure mental resilience and has been shown to exhibit good reliability and validity in Chinese populations [31,32]. Each item included in the CD-RISC is scored on a four-point Likert scale ranging from 0 (“not true at all”) to 4 (“nearly all the time”). The total score ranges from 0 to 40, and higher scores indicate greater ability to cope with adversity. In this study, the Cronbach’s α coefficient of the CD-RISC-10 was 0.913, thus indicating good reliability.

2.3. Statistical analysis

All the statistical analyses were conducted using SPSS version 25.0 software. Student’s *t*-test and a one-way analysis of variance (ANOVA) were employed to compare the psychological resilience scores across subgroups. Additionally, multiple linear regression was performed to identify factors that were associated with psychological resilience among primary care workers.

All the statistical tests were two-sided, and $p < 0.05$ was considered to indicate statistical significance.

3. Results

The survey was completed by a total of 417 primary care workers, including 125 (30.0 %) men and 292 (70.0 %) women, whose mean age was 38.5 ± 8.5 years (range: 22–62 years). The average mental health knowledge score among participants was 17.47 ± 2.11 , and nearly 84.4 % of these individuals exhibited appropriate levels of mental health knowledge (score ≥ 16). In terms of mental health skills, the scores pertaining to interpersonal support, cognitive reappraisal, distracting attention were 8.18 ± 1.61 , 8.08 ± 1.59 and 14.8 ± 2.02 , respectively. Based on the average score of 3.0, which was used as the criterion for mental health skills, the attainment rates of mental health skills, ranging from high to low, were 60.9 % (254/417) for distracting attention, 45.3 % (189/417) for interpersonal support and 43.9 % (183/417) for cognitive reappraisal (see Table 1), thus indicating that primary care workers exhibited relatively poor mental health skills.

The average psychological resilience score exhibited by the primary care workers included in this study was 27.81 ± 5.71 . As shown in Table 2, men exhibited significantly greater psychological resilience than women ($p = 0.006$), and participants who were older than 40 years also exhibited greater resilience ($p = 0.002$). However, no significant difference was observed in psychological

Table 1

Scores and attainment rates of Mental health knowledge and skills in primary care physicians (N = 417).

Variables	Score (mean \pm SD)	Total number	Attainment number	Attainment rate (%)
Mental health knowledge	17.47 ± 2.11	417	352	84.4
Mental health skills				
Interpersonal support	8.18 ± 1.61	417	189	45.3
Cognitive reappraisal	8.08 ± 1.59	417	183	43.9
Distract attention	14.8 ± 2.02	417	254	60.9

Table 2
Characteristics of the survey sample and scores of psychological resilience in primary care physicians (N = 417).

Variables	number	Score (mean \pm SD)	t/F	P
Sex				
Men	125	28.98 \pm 5.58	2.76	0.006
Women	292	27.31 \pm 5.70		
Age (years)				
<30	91	26.20 \pm 5.80	6.23	0.002
31~40	142	27.65 \pm 5.37		
>40	184	28.73 \pm 5.77		
Education				
College degree or lower	154	27.87 \pm 5.93	0.16	0.876
Bachelor's degree or above	263	27.78 \pm 5.60		
Department				
Psychiatric	119	28.25 \pm 5.14	0.99	0.322
Nonpsychiatric	298	27.64 \pm 5.93		
Family per-capita annual income (CHY)				
\geq 30,000	249	28.20 \pm 5.42	1.67	0.095
<30,000	168	27.24 \pm 6.01		

resilience between psychiatric and nonpsychiatric primary care workers ($p = 0.322$).

The full pattern of correlations thus observed is summarized in Table 3. The results showed that interpersonal support and distracting attention were positively correlated with psychological resilience ($p < 0.001$), while no significant correlation was observed between mental health knowledge and psychological resilience. Moreover, a significant positive correlation was observed between cognitive reappraisal and mental health knowledge ($p < 0.05$). In terms of mental health skills, interpersonal support, cognitive reappraisal, distracting attention were found to be positively correlated with each other ($p < 0.001$). The results of the multiple linear regression analysis suggested that after adjusting for demographic variables, certain mental health skills, including interpersonal support ($\beta = 0.468$, $p = 0.003$) and distracting attention ($\beta = 1.291$, $p < 0.001$), were significantly positively associated with psychological resilience among primary care workers (Table 4).

4. Discussion

Medical work is characterized by high levels of risk, workload and pressure, particularly among primary care workers in local primary medical institutions. Psychological resilience refers to the process by which an individual adapts to a stressful environment [33], and poor psychological resilience may increase individuals' likelihood of experiencing mental health problems, such as anxiety, depression and insomnia [34,35]. In the present study, the average psychological resilience score for primary care workers was 27.81 ± 5.71 ; however, this finding was in consistent with the results reported in a previous survey of Chinese medical staff working in different posts [36], indicating that the resilience of primary care workers in Wuhan is at a moderate level and thus requires further improvement. The greater psychological resilience exhibited by men suggested that men are better able to adapt to stress than are women. Furthermore, the lower resilience exhibited by young primary care workers suggested that these workers face a difficult period of psychological adaptation to their job roles and job content, thus indicating that more attention should be given to the pressure associated with career development among medical staff with less experience on the job and that additional guidance and support should be provided to these individuals [37].

In this study, we observed that the overall rate of awareness of mental health knowledge among primary care workers in Wuhan, China, was 84.4 %, which is slightly higher than levels that have previously been reported [38]. This finding might be related to a pilot project of the national social and psychological service system that was implemented in Wuhan. As part of this project, psychological training was provided to mental health workers, including primary care workers, with the goal of promoting their mental health literacy. Despite the relatively high level of mental health knowledge these participants exhibited, we also observed relatively poor mental health skills among primary care workers; namely, less than half of the primary care workers possessed sufficient skills with regard to interpersonal support and cognitive reappraisal, thus suggesting that primary care workers require targeted training in mental health skills.

Additionally, we found that interpersonal support and distracting attention were significantly positively associated with psychological resilience. Mental health skills and beliefs can help individuals cope with negative life events and mental health problems more

Table 3
The association between mental health literacy and psychological resilience.

Variables	Psychological resilience	Mental health knowledge	Interpersonal support	Cognitive reappraisal
Mental health knowledge	0.012	1.000	–	–
Interpersonal support	0.177**	0.018	1.000	–
Cognitive reappraisal	0.091	0.099*	0.169**	1.000
Distract attention	0.461**	0.082	0.193**	0.282**

* $P < 0.05$, ** $P < 0.001$.

Table 4

Association between mental health literacy and psychological resilience in primary care physicians.

Variables	β	S.E.	Beta	t	P
Sex	-2.157	0.545	-0.173	-3.95	<0.001
Age	0.807	0.333	0.110	2.42	0.016
Education	0.246	0.532	0.021	0.46	0.644
Department	-0.078	0.550	-0.006	-0.14	0.887
Annual household income per capital	0.155	0.521	0.013	0.30	0.766
Mental health knowledge	-0.026	0.122	-0.010	-0.22	0.830
Mental health skills					
Interpersonal support	0.468	0.157	0.132	2.97	0.003
Cognitive reappraisal	-0.191	0.161	-0.053	-1.19	0.236
Distract attention	1.291	0.129	0.456	9.99	<0.001

actively and effectively and thus improve their well-being and psychological resilience. Although some demographic risk factors pertaining to psychological resilience, such as being female and being young, are relatively fixed, the concept of learned resilience that emerged from this research emphasizes the development of behavioral and cognitive coping skills [39]. Coping skills include the strategies used to manage stress and solve problems, such as reducing negative thinking, and the ability to consider multiple perspectives [40], which can help individuals recover from traumatic events by preventing the emergence of mental health challenges [41]. Researchers have proposed that the utilization of positive coping strategies such as interpersonal support can enhance psychological resilience among health care workers, mitigate their work burnout and improve their work efficiency [42]. Several strategies for developing resilience among health care systems, including self-care, organizational justice, computer-based resilience training and resilience-focused education sessions, have previously been developed [42,43]. However, some of these strategies require substantial preparation time and involve potentially challenging negotiations, and evidence regarding the effectiveness of these strategies with regard to enhancing the resilience of medical staff remains lacking [42,44].

Several limitations of the current study must be considered. First, the cross-sectional design of this study limits our ability to draw conclusions regarding the causal relationships between the identified factors and psychological resilience. Second, the study sample was limited to primary care workers in Wuhan, China, and our findings should be generalized to other regions only with caution. Third, the absence of prior experiences such as those pertaining to past social support may also limit our understanding of psychological resilience among this population.

5. Conclusion

The resilience of primary care workers in Wuhan is at a moderate level and thus requires further improvement. More importantly, mental health skills such as interpersonal support and distracting attention were revealed to be important protective factors against psychological resilience. Hence, interventions targeting mental health skills are recommended for primary care workers with the goal of enhancing their psychological resilience.

Statements and declarations

Ethics statement

This study was reviewed and approved by the Ethics Committee of the Wuhan Mental Health Center, with the approval number: KY2020.1221.01. And all participants provided informed consent to participate in the study.

Data availability statement

Data will be made available on request.

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CRedit authorship contribution statement

Mo Chen: Writing – original draft. **Gui-Yang Wang:** Data curation, Investigation. **Hao-Fei Zhao:** Investigation, Resources. **Cheng-cheng Wang:** Formal analysis, Investigation. **Yang Zhou:** Supervision, Writing – review & editing. **Bao-Liang Zhong:** Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Bao-Liang Zhong reports a relationship with Advisory Board of Heliyon that includes: board membership.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e31918>.

References

- [1] L. Huang, Y.Q. Miao, Working status of primary health care workers during the epidemic period: a cross-sectional study, *Chin. J. Public Health* 38 (5) (2022) 582–584.
- [2] L. Sang, H. Liu, H. Yan, J. Rong, J. Cheng, L. Wang, G. Li, Y. Guo, L. Zhang, H. Ding, G. Chen, R. Chen, Incentive preferences and its related factors among primary medical staff in anhui province, China: a cross-sectional study, *Front. Public Health* 9 (2021) 778104.
- [3] B.L. Zhong, Y.F. Ruan, Y.M. Xu, W.C. Chen, L.F. Liu, Prevalence and recognition of depressive disorders among Chinese older adults receiving primary care: a multi-center cross-sectional study, *J. Affect. Disord.* 260 (2020) 26–31.
- [4] Peking Union Medical College Press, *China Health Statistics Yearbook 2022*, 2022. Beijing.
- [5] Z.Q. Wang, L. Fei, Y.M. Xu, F. Deng, B.L. Zhong, Prevalence and correlates of suspected dementia in older adults receiving primary healthcare in Wuhan, China: a multicenter cross-sectional survey, *Front. Public Health* 10 (2022) 1032118.
- [6] N. Tang, L. Han, P. Yang, Y. Zhao, H. Zhang, Are mindfulness and self-efficacy related to presenteeism among primary medical staff: a cross-sectional study, *Int. J. Nurs. Sci.* 6 (2) (2019) 182–186.
- [7] C. Lee, B. Yun, W.T. Lee, J. Sim, C.N. Kim, J.U. Won, J.H. Yoon, Resilience and depressive symptoms among medical staff in a Military hospital Dedicated to the treatment of COVID-19, *Int J Environ Res Public Health* 19 (18) (2022).
- [8] Y. Liu, H. Chen, N. Zhang, X. Wang, Q. Fan, Y. Zhang, L. Huang, B. Hu, M. Li, Anxiety and depression symptoms of medical staff under COVID-19 epidemic in China, *J. Affect. Disord.* 278 (2021) 144–148.
- [9] Q. Wu, D. Li, M. Yan, Y. Li, Mental health status of medical staff in Xinjiang Province of China based on the normalisation of COVID-19 epidemic prevention and control, *Int. J. Disaster Risk Reduc.* 74 (2022) 102928.
- [10] D. Paton, D.J.D.P. Johnston, M.A.I. Journal, Disasters and communities: vulnerability, resilience and preparedness 10 (4) (2001) 270–277.
- [11] A. Sisto, F. Vicinanza, L.L. Campanozzi, G. Ricci, D. Tartagliini, V. Tambone, Towards a transversal definition of psychological resilience: a literature review, *Medicina (Kaunas)* 55 (11) (2019).
- [12] S. Hao, Burnout and depression of medical staff: a chain mediating model of resilience and self-esteem, *J. Affect. Disord.* 325 (2023) 633–639.
- [13] Y.Q. Shi, X.Q. Dai, W.Y. Dong, L.H. Li, J. Fu, Analysis of the status and influencing factors of psychological resilience of clinical nurses in fighting against coronavirus disease 2019, *Chin. J. Nurs.* 55 (S1) (2020) 108–112.
- [14] B.L. Fredrickson, M.M. Tugade, C.E. Waugh, G.R. Larkin, What good are positive emotions in crises? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001, *J. Pers. Soc. Psychol.* 84 (2) (2003) 365–376.
- [15] Giuseppe M. Di, G. Nepa, T.A. Prout, F. Albertini, S. Marcelli, G. Orru, C. Conversano, Stress, burnout, and resilience among healthcare workers during the COVID-19 emergency: the role of defense mechanisms, *Int J Environ Res Public Health* 18 (10) (2021).
- [16] I.A. Meynaar, T. Ottens, M. Zegers, M.M.C. van Mol, I.C.C. van der Horst, Burnout, resilience and work engagement among Dutch intensivists in the aftermath of the COVID-19 crisis: a nationwide survey, *J. Crit. Care* 62 (2021) 1–5.
- [17] J. Nobre, A.P. Oliveira, F. Monteiro, C. Sequeira, C. Ferre-Grau, Promotion of mental health literacy in adolescents: a Scoping review, *Int J Environ Res Public Health* 18 (18) (2021).
- [18] A. Marinucci, C. Grove, K.A. Allen, Australian school staff and allied health professional perspectives of mental health literacy in schools: a mixed methods study, *Educ. Psychol. Rev.* 35 (1) (2023) 3.
- [19] J. Katz, S.H. Mercer, S. Skinner, Developing self-concept, coping skills, and social support in grades 3–12: a cluster-randomized trial of a combined mental health literacy and dialectical behavior therapy skills program, *School Mental Health* 12 (2) (2020) 323–335.
- [20] A.F. Jorm, Mental health literacy: empowering the community to take action for better mental health, *Am. Psychol.* 67 (3) (2012) 231–243.
- [21] P. Li, Research on the Status Quo and Relationship between Mental Health Literacy and Positive Psychological Capital, Coping Style of Middle School Students in Impoverished Areas, *Master's Dissertation*, Yunnan Normal University, 2018.
- [22] J. Ruan, Y.M. Xu, B.L. Zhong, Loneliness in older Chinese adults amid the COVID-19 pandemic: prevalence and associated factors, *Asia Pac. Psychiatr.* 15 (4) (2023) e12543.
- [23] L. Song, Y. Wang, Q. Zhang, J. Yin, W. Gan, S. Shang, L. Qi, S. Chen, T. Liu, The mediating effect of resilience on mental health literacy and positive coping style among Chinese empty nesters: a cross-sectional study, *Front. Psychol.* 14 (2023) 1093446.
- [24] X. Zhang, H. Yue, X. Hao, X. Liu, H. Bao, Exploring the relationship between mental health literacy and psychological distress in adolescents: a moderated mediation model, *Prev Med Rep* 33 (2023) 102199.
- [25] B. Agyapong, R. Shalaby, Y. Wei, V.I.O. Agyapong, Can ResilienceNHop, an evidence-based text and email messaging innovative suite of programs help to close the psychological treatment and mental health literacy gaps in college students? *Front. Public Health* 10 (2022) 890131.
- [26] C.C. Lo, I.C. Chen, W.S. Ho, Y.C. Cheng, A sequential mediation model of perceived social support, mindfulness, perceived hope, and mental health literacy: an empirical study on Taiwanese university students, *Acta Psychol.* 240 (2023) 104016.
- [27] B.L. Zhong, H.J. Li, Y.M. Xu, X.F. Jiang, Clinical insomnia among elderly primary care attenders in Wuhan, China: a multicenter cross-sectional epidemiological study, *Front. Public Health* 10 (2022) 1026034.
- [28] M. Chen, G.R. Lin, G.Y. Wang, L. Yang, N. Lyu, C. Qian, J.X. Lan, Y. Zhou, B.L. Zhong, Stigma toward mental disorders and associated factors among community mental health workers in Wuhan, China, *Asia Pac. Psychiatr.* 15 (2–3) (2023) e12542.
- [29] J.H. Hong, L. Cao, X.D. Wang, Z.Y. Du, Z.Y. Li, Q.H. Zuo, X.M. Weng, Analysis of mental health status of Hainan residents, *China Trop. Med.* (2022) 1–8.
- [30] S. Li, B. Guo, X. Lu, Q. Yang, H. Zhu, Y. Ji, Y. Jiang, Investigation of mental health literacy and status of residents during the Re-outbreak of COVID-19 in China, *Front. Public Health* 10 (2022) 895553.
- [31] L. Wang, Z. Shi, Y. Zhang, Z. Zhang, Psychometric properties of the 10-item connor-davidson resilience scale in Chinese earthquake victims, *Psychiatry Clin Neurosci* 64 (5) (2010) 499–504.

- [32] C. Cheng, D. Dong, J. He, X. Zhong, S. Yao, Psychometric properties of the 10-item Connor-Davidson Resilience Scale (CD-RISC-10) in Chinese undergraduates and depressive patients, *J. Affect. Disord.* 261 (2020) 211–220.
- [33] L.S. Zhang, B. Zhang, L. Hu, The relationship between perceived stress and sleep quality of Wuhan residents during COVID-19 outbreak: psychological resilience as a moderator, *Chin. J. Dis. Control Prev.* 24 (6) (2020) 638–642.
- [34] L.L. Yu, Y.Z. Xu, W.H. Li, X. Gao, X.Y. Wang, Anxiety and depression in medical and non-medical staff during the COVID-19 epidemic, *Chin. Ment. Health J.* 36 (5) (2022) 451–456.
- [35] L. Fu, B. Wang, P.S.F. Chan, D. Luo, W. Zheng, N. Ju, Y. Hu, X. Xiao, H. Xu, X. Yang, Y. Fang, Z. Xu, P. Chen, J. He, H. Zhu, H. Tang, D. Huang, Z. Hong, X. Ma, Y. Hao, L. Cai, J. Yang, J. Yuan, Y.Q. Chen, F. Xiao, Z. Wang, S. Ye, H. Zou, Associations between COVID-19 related stigma and sleep quality among COVID-19 survivors six months after hospital discharge, *Sleep Med.* 91 (2022) 273–281.
- [36] L.Q. Wang, M. Zhang, G.M. Liu, S.Y. Nan, T. Li, L. Xu, Y. Xue, M. Zhang, L. Wang, Y.D. Qu, F. Liu, Psychological impact of coronavirus disease (2019) (COVID-19) epidemic on medical staff in different posts in China: a multicenter study, *J. Psychiatr. Res.* 129 (2020) 198–205.
- [37] M. Zhang, Y.J. Zhu, Y.Z. Peng, Investigation on status quo and influencing factors of job burnout among medical staff: a case study of TCM hospital in Nanjing, *J. Nan Jing Med. Univ.* 16 (2) (2016) 115–119.
- [38] S. Guo, J. Xiong, F. Liu, Y. Su, Mental health literacy levels of medical staff in China: an assessment based on a meta-analysis, *Front Psychiatry* 12 (2021) 683832.
- [39] M. Schreiber, D.S. Cates, S. Formanski, M. King, Maximizing the resilience of healthcare workers in multi-hazard events: lessons from the 2014-2015 ebola response in Africa, *Mil. Med.* 184 (Suppl 1) (2019) 114–120.
- [40] J.P. Shatkin, U. Diamond, Y. Zhao, J. DiMeglio, M. Chodaczek, J.-M. Bruzzese, Effects of a risk and resilience course on stress, coping skills, and cognitive strategies in college students, *Teach. Psychol.* 43 (3) (2016) 204–210.
- [41] T. Powell, S.J. Thompson, Enhancing coping and supporting protective factors after a disaster: findings from a quasi-experimental study, *Res. Soc. Work. Pract.* 26 (5) (2014) 539–549.
- [42] C. Heath, A. Sommerfield, B.S. von Ungern-Sternberg, Resilience strategies to manage psychological distress among healthcare workers during the COVID-19 pandemic: a narrative review, *Anaesthesia* 75 (10) (2020) 1364–1371.
- [43] G. McDonald, D. Jackson, M.H. Vickers, L. Wilkes, Surviving workplace adversity: a qualitative study of nurses and midwives and their strategies to increase personal resilience, *J. Nurs. Manag.* 24 (1) (2016) 123–131.
- [44] A. Pollock, P. Campbell, J. Cheyne, J. Cowie, B. Davis, J. McCallum, K. McGill, A. Elders, S. Hagen, D. McClurg, C. Torrens, M. Maxwell, Interventions to support the resilience and mental health of frontline health and social care professionals during and after a disease outbreak, epidemic or pandemic: a mixed methods systematic review, *Cochrane Database Syst. Rev.* 11 (11) (2020) CD013779.