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## The prolonged COVID-19 pandemic caused significant psychosomatic symptoms in frontline healthcare workers

Dear Editor

On 9th December 2021, a COVID-19 outbreak was discovered in Xi'an and Zhengzhou in China, causing an overwhelming threat to the city's health care system. The support was requested throughout the National Health Commission of the People's Republic of China, and numerous healthcare workers (HCWs), including physicians and nurses, volunteered to assist the two cities. Notably, the prolonged pandemic has caused a heavy physical and psychological burden, affecting the economy, social life, and others as a massive challenge. The rapidly increasing number of patients quickly overdraw medical resources, resulting in a shortage of HCWs and devices all over the country. Recent studies (Eftekhar *et al.*, 2021) show that HCWs often experience the occurrence and transformation of various negative emotions during the pandemic. Negative emotions in HCWs may impact their health and hinder the patient's daily care, with worse outcomes (Coifman *et al.*, 2021). Studies have also examined the relationship between perceived stress and social support among HCWs concerning occupational stressors and psychosomatic symptoms (Zou *et al.*, 2022). However, there are few studies on the psychosomatic symptoms of HCWs in the context of the pandemic. These conditions have impacted the pandemic itself and society, posing a severe threat to the population's health, especially the mental health and psychosomatic symptoms of HCWs.

We recruited 344 HCWs. Psychosomatic Symptom Scale, the Chinese perceived stress scales, 7-item Generalized Anxiety Disorder Scale, and 9-item Patient Health Questionnaire were assessed. Forty-six cases were excluded due to invalid questionnaires and incomplete information. 288 HCWs, 32 males (11.11%) and 256 females (88.89%), were included for further analysis. We found that 101 HCWs (35.07%) reported psychosomatic symptoms. HCWs with psychosomatic symptoms also exhibited higher perceived stress, more severe anxiety, and depressed mood ( $P < 0.001$ ). Multiple linear regression analysis showed that anxiety, depression, and perceived stress were significant predictors of psychosomatic symptoms of HCWs, which explained 69.1% of the variance of psychosomatic symptoms. Correlation analysis revealed a significant correlation between the four variables of psychosomatic symptoms,

anxiety, depression, and perceived stress among HCWs ( $P < 0.001$ ). We observed a significant mediating effect of anxiety and depression on the association between perceived stress and psychosomatic symptoms (effect value = 0.236, Standard Error = 0.050, Bootstrap 95% CI = 0.147 to 0.341).

The study revealed that more than one-third of participants had psychosomatic symptoms and exhibited severer anxiety, depression, and perceived stress. Providing health and safety measures, psychological support, and improving safety and confidence is helpful to HCWs (Marinaci *et al.*, 2021). Stress, anxiety, and depression were associated with psychosomatic burden in HCWs. Anxiety and depression mediated between perceived stress and psychosomatic symptoms. The chain intermediary analysis also shows that emotions such as anxiety and depression mediate between perceived stress and psychosomatic symptoms in HCWs. Health system personnel and policymakers should prioritize their mental health and implement appropriate interventions to reduce depression and anxiety (Ullah *et al.*, 2022).

The main strengths of this study are that it provided a sketch of the psychosomatic symptoms of the HCW during the prolonged pandemic. We revealed that perceived stress among HCWs might lead to psychosomatic symptoms. Meanwhile, we provided implications for developing psychological prevention and intervention programs for other HCWs who suffer from psychosomatic problems during similar events. The study was cross-sectional, with a relatively small sample size. Future studies should include more participants from different regions for a more representative sample. Follow-up and active surveillance of psychosomatic symptoms in HCWs were essential to maintain their health, work efficiency, and life quality (Fig. 1 and Table 1).

### Declaration of Competing Interest

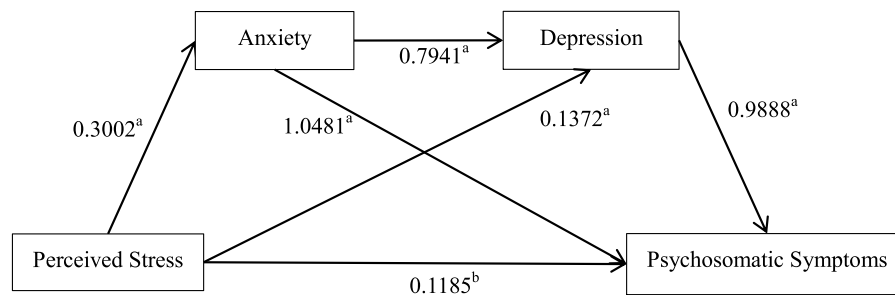
None.

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**Fig. 1.** Mediated effect of anxiety and depression in the relationship between perceived stress and psychosomatic symptoms in healthcare workers. Note: <sup>a</sup>  $P < 0.001$ , <sup>b</sup>  $P < 0.05$ .

**Table 1**  
Demographics and assessments.

Variables	Group with PSSS $\geq$ 10 (n=101)	Group with PSSS<10 (n=187)	Z/ $\chi^2$ value	P value
Gender (n, %)			1.603 <sup>b</sup>	0.205
Male	8 (2.78)	24 (8.33)		
Female	93 (32.29)	163 (56.60)		
Age [years, M (P <sub>25</sub> , P <sub>75</sub> )]	31 (27.50, 35)	32 (28, 37)	-1.504 <sup>a</sup>	0.133
Occupation (n, %)			0.995 <sup>b</sup>	0.319
Physicians	9 (3.13)	24 (8.33)		
Nurses	92 (31.94)	163 (56.60)		
Education level (n, %)			0.950 <sup>b</sup>	0.813
College	9 (3.13)	14 (4.86)		
Undergraduate	80 (27.78)	145 (50.35)		
Master	10 (3.47)	21 (7.29)		
Doctorate	2 (0.69)	7 (2.43)		
Marital Status (n, %)			1.093 <sup>b</sup>	0.579
Unmarried	31 (10.76)	56 (19.44)		
Married	70 (24.31)	129 (44.79)		
Divorced	0	2 (0.69)		
CPSS [Scores, M (P <sub>25</sub> , P <sub>75</sub> )]	28 (25, 31)	17 (12, 23)	-9.556 <sup>a</sup>	< 0.001
GAD-7 [Scores, M (P <sub>25</sub> , P <sub>75</sub> )]	7 (5.50, 10)	1 (0, 3)	-11.448 <sup>a</sup>	< 0.001
PHQ-9 [Scores, M (P <sub>25</sub> , P <sub>75</sub> )]	9 (7, 13)	2 (0, 5)	-11.959 <sup>a</sup>	< 0.001

a: Z value, b:  $\chi^2$  value, PSSS: Psychosomatic Symptom Scale, CPSS: Chinese Perceived Stress Scale, GAD-7: 7-item Generalized Anxiety Disorder Scale, PHQ-9: 9-item Patient Health Questionnaire.

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